The Builder

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For particulars apply to the Attendant in the Gallery of the Architectural Museum; at the Office of "The Builder" or by letter to the Honorary Secretary, at 13, Stratford-place, W.

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MINERALOGY.—KING'S COLLEGE, LONDON.—PROFESSOR TENNANT, F.G.S. will Commence a Course of LECTURES on MINERALOGY, with a view to facilitate the Study of Geology, and of the Application of Mineral Substances in the Arts. The Lectures will begin on FRIDAY Morning, OCTOBER 4, at NINE o'clock. They will be continued on each succeeding WEDNESDAY and FRIDAY, at the same hour. Fee, 2*l.* 2*s.*

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PROFESSOR DONALDSON'S LECTURES on ARCHITECTURE and CONSTRUCTION, for the Session 1861-2, at University College, will commence on TUESDAY, the 22nd OCTOBER, at 6:30 P.M.—Full particulars may be obtained on application at the College Office, Gower-street, W.C.

EXAMINATIONS for SCIENCE CERTIFICATES of the COMMITTEE of COUNCIL on EDUCATION.—The Annual Examination of the Department of Science and Art, for Certificates as Science Teachers, will commence at South Kensington, on MONDAY, the 4th NOVEMBER. Candidates wishing to present themselves, must forward their names to the Secretary, Science and Art Department, South Kensington, London, W. on or before the 15th OCTOBER, except those coming up in Mechanical and Machine Drawing and Building Construction, who must send in their names by the 5th OCTOBER.

By order of the Committee of Council on Education.

THE METROPOLITAN BUILDING ACT, 1855, Section 33.—The Institute of British Architects hereby give notice that an EXAMINATION of persons desirous of obtaining a Certificate of Competency to perform the duties of District Surveyor will take place at the Rooms of the Institute, No. 9, Conduit-street, Hanover-square, W. on THURSDAY, the 31st day of OCTOBER, at ELEVEN o'clock in the forenoon. Persons desirous to be examined must, on or before TUESDAY, the 22nd day of OCTOBER, send an application, which must be accompanied by a statement according to a form to be previously obtained at the Rooms of the Institute.

T. HAYTER LEWIS, JAMES BELL, } Hon. Secretaries.

Conduit-street, 30th September, 1861.

MR. T. J. HILL'S PRACTICAL DRAWING ESTABLISHMENT.—The WINTER QUARTER commences on the 1st of OCTOBER, and ends on the 25th of DECEMBER. Instruction will be given in Architectural, Mechanical, and Perspective Drawing, every evening during the quarter, except on the first and third WEDNESDAY of every month, when a paper on some subject connected with the profession will be read, a list of which, and by whom to be read, may be had at the Offices, 70, Old Street. Fee for the quarter, including the Paper Nights, 1*l.* 1*s.* Day, 3*l.* 3*s.*

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COMPETITIONS.

TO ARCHITECTS, SCULPTORS, and OTHERS.—The Committee of the Mr. Emery Testimonial Fund are prepared to receive DESIGNS for a MONUMENTAL MEMORIAL of the Late Roman Catholic Dean of Ardfort.—Address, HENRY DONOVAN, Chairman; or Mr. E. POWER, Treasurer of the Committee, Tralee, Ireland.

CONTRACTS.

TO BUILDERS and OTHERS.—The Commissioners of Sewers of the City of London, acting as the Burial Board for the said City, will meet in the Guildhall of the said City, on TUESDAY, the 8th of OCTOBER next, at ONE o'clock precisely, to receive TENDERS for INCLOSING, DRAINING, and LAYING OUT a PLOT of LAND, adjoining the City of London Cemetery, at Little Ilford, to be added to the said cemetery, agreeably to plans and specification, to be seen at the Engineer's Temporary Offices, 39, King-street, Cheapside. Security will be required for the due performance of the contract. The Commissioners do not pledge themselves to accept the lowest offer; and no Tender will be received after ONE o'clock on the day of treaty.

JOSEPH DAW, Principal Clerk.

Sewers Office, Guildhall, September 21, 1861.

NEW CONGREGATIONAL CHURCH, BOLTON.—To BUILDERS.—The DRAWINGS, SPECIFICATIONS, and CONDITIONS may be SEEN, and lithographed Copies of the Quantities obtained, on application at the Office, on the site, St. George's-road, Bolton, between the hours of TEN and TWELVE, and TWO and FOUR, from MONDAY, the 30th of SEPTEMBER, to MONDAY, the 14th of OCTOBER. Sealed Tenders to be delivered to the Rev. W. H. DAVISON, 31, Chorley New-road, Bolton, on or before the 14th of OCTOBER. The lowest Tender not necessarily accepted.—Further information may be had from us.

THOMAS OLIVER, ROBERT LAMB, } Architects.

Newcastle-upon-Tyne, September 25, 1861.

TO BUILDERS.—Persons willing to TENDER for BUILDING and completely FINISHING a BLOCK of THREE HOUSES at East Moulsey, Surrey (within a quarter of a mile of the Hampton Court Station), can inspect the drawings and specification at the Architect's Office, who reserves the right of rejecting the lowest or any Tender. Tenders to be delivered on MONDAY, OCTOBER 14th, not later than FOUR o'Clock.

HENRY McCALLA, Civil Engineer, Architect.

Office, 25, Westbourne-place, Eaton-square.

METROPOLIS LOCAL MANAGEMENT ACT.—Notice is hereby given, that the Vestry of Paddington are ready to receive TENDERS from parties willing to CONTRACT for the CONSTRUCTION of about 610 feet run 3 feet 9 inches and 2 feet 6 inches BRICK SEWER, and about 4,330 feet run of new STONEWARE INVERT, and underpinning to old sewers, in Sussex-square, Westbourne-terrace, and adjacent streets, together with other works incidental thereto. The Tenders to be sent, sealed and directed, "To the Vestry," and left at the Vestry Hall, Harrow-road, on or before MONDAY, the 14th day of OCTOBER next; and persons sending Tenders are requested to be in attendance on the following morning (TUESDAY), at TEN o'clock precisely. Specification, plans, and sections may be seen, and all particulars obtained, from Mr. WM. MERRY, Surveyor, at the Vestry-hall aforesaid, between the hours of TEN and TWELVE A.M. The party whose Tender may be accepted will be required to provide two sureties in the sum of 500*l.* each for the due performance of the Works. The expense of the contract to be paid by the contractor. The Vestry do not bind themselves to accept the lowest or any Tender.—By order,

Paddington, Oct. 1st, 1861. FREDK. AVELING, Vestry Clerk.

CONTRACTS.

TO DUST CONTRACTORS.—PARISH of CHELSEA.—The Vestry of the Parish of Chelsea will meet at the Vestry Hall, King's-road, Chelsea, on TUESDAY, the 8th day of OCTOBER next, at THREE o'clock in the afternoon, to consider the TENDERS from persons willing to CONTRACT, according to the terms and conditions of a Specification (a printed copy of which may be had on application to the Vestry Clerk), for COLLECTING and REMOVING the DUST, ASHES, FILTH, and RUBBISH from the houses and other places within one or the other or both of the two divisions of the said parish during the period commencing from the acceptance of the Tender, and ending the 29th day of SEPTEMBER, 1862. The draft of a contract to be entered into for carrying out the terms of the specification is now lying for inspection at the Offices of the Vestry. Parties Tendering must appear personally on the day the Tenders are opened, and one-fourth of the sum offered is to be paid on the acceptance of the Tender, and the remaining three-fourths as provided in the said draft contract. The costs, charges, and expenses of, and incidental to, the preparation and competition of the Contract, to be paid by the Contractor upon the execution of the same. Sealed Tenders, signed by the proposed Contractor, with the names and description of two sufficient sureties for the performance of his Contract, are to be left at the said Office by or before TWELVE o'clock on the said 8th day of OCTOBER; but no Tender will be received or accepted unless made on one of the printed forms to be obtained at the said Office. The Vestry do not bind themselves to accept any Tender.—By order,

CHARLES LAHEE, Vestry Clerk.

Vestry Hall, King's-road, Chelsea, 26th September, 1861.

BRISTOL WATER-WORKS.—CONTRACTS for WORKS.—The Directors are prepared to receive TENDERS for COMPLETING the SINKING a WELL at North Hill, in the Parish of Chew Stoke, near Bristol, according to specification, which, with the form of Tender, may be seen at the Company's Office, Small-street, Bristol, on application, between the hours of TEN and ONE o'clock daily. Sealed Tenders, endorsed, "Tenders for Sinking a Well," to be delivered at the Company's Office, before TWELVE o'clock, on FRIDAY, the 11th OCTOBER, addressed to Mr. CHAS. WM. BRAGGE, the Secretary. The Directors do not pledge themselves to accept the lowest Tender, nor any Tender until the security be approved.

Small-street, Bristol, 27th September, 1861.

TO BUILDERS.—Persons desirous of giving TENDERS for the ERECTION of the United Presbyterian Church and Lecture Hall, Clapham-road, are requested to send their names and references, by letter, to the Architects, Messrs. W. G. HABERSHON & PITE, 38, Bloomsbury-square, W.C. The Architects do not bind themselves to answer all the applications made to them.

TO MASONS and PAVIORS.—The Board of Works for the Wandsworth District are desirous of receiving TENDERS for the PROVIDING and LAYING of about 9,000 feet run of 12-inch by 9-inch dressed ABERDEEN GRANITE CITY KERB, and about 6,480 feet superficial of 3-inch YORK PAVING, 4 feet wide, in the parish of Battersea. The specification can be seen at the Offices of the Board, Battersea-rise, between the hours of NINE and FIVE. Sealed Tenders are to be sent in, addressed to the Board, and endorsed, "Tenders for Paving, &c. Battersea," on or before TUESDAY, the 8th OCTOBER. Security will be required for the due execution of the contract. The Board do not pledge themselves to accept any Tender. By order of the Board of Works for the Wandsworth District.

ARTHUR ALEX. CORSELLIS, Clerk to the Board.

Battersea-rise, Wandsworth, S.W. September 26, 1861.

BUILDERS willing to TENDER for BUILDING and completely FINISHING TWO HOUSES, in Sussex, can inspect the drawings and specification, at the Office of the Architect, who reserves the right of rejecting the lowest or any Tender.—Tenders to be delivered at the Architect's Office, SATURDAY, AUGUST 12th, at ONE o'clock punctually, after which time no Tender will be received. HENRY McCALLA, C.E. Architect.

Office, 25, Westbourne-place, Eaton-square.

TO BUILDERS.—Persons willing to TENDER for the ERECTION of a small COTTAGE RESIDENCE at Hampstead can inspect the plans and specification, between TEN and FIVE, at the Offices of Mr. FRANCIS CROSS, Architect, 2, Keppel-street, Russell-square, W.C. The lowest, nor any other Tender, not necessarily accepted. The Tenders must be delivered on the 10th of OCTOBER, before TWELVE a.m.

NOTICE to MASONS and BUILDERS.—The Trustees of the Charities and the Churchwardens of Faversham, in Kent, give Notice that persons desirous of TENDERING for the ERECTION of a south GATEWAY and a BOUNDARY WALL at the churchyard of the parish of Faversham, in accordance with designs of GEORGE GILBERT SCOTT, Esq. Architect, may inspect the drawings and specification, and obtain the form of Tender, at the Office of Mr. FRANCIS F. GIRAUD, Solicitor, Faversham, the Clerk to the said Trustees, between the hours of TEN and FOUR, and that Tenders are to be sent to the same Office under seal, directed to the said Clerk, and endorsed "Tender for Churchyard Buildings," on or before the 4th day of NOVEMBER next. The Trustees and Churchwardens do not pledge themselves to accept the lowest or either of the Tenders.

Faversham, 30th September, 1861.

TO BUILDERS and CONTRACTORS.—WANTED, TENDERS for the ERECTION of a BREWHOUSE and OFFICES, and additions to farm-buildings, at Middleton-park Farm, on the estate of the Right Hon. Lord Vernon, at Hungry Bentley, in the county of Derby. Plans and specifications may be seen on application to G. W. HAY, Esq. Sudbury, near Derby. Sealed Tenders must be delivered to Messrs. GIRDWOOD, Farm Architects, 49, Pall-mall, London, on or before the 19th of OCTOBER. The lowest or any Tender will not necessarily be accepted.

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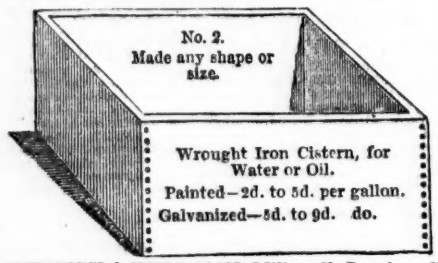

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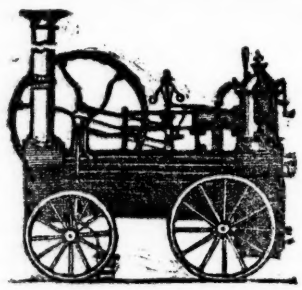

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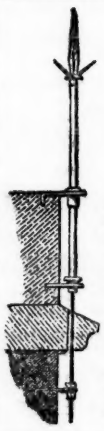

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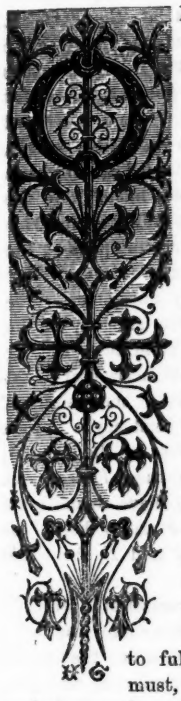
The Builder.

VOL. XIX.—No. 974.

The Mechanics of Construction.



N this subject, which is one of the highest importance to the architect, we have before us the most recent work that has appeared. It is intended to supply a want that all must have felt who have endeavoured to study architecture scientifically; namely, that of a small and compendious volume on the practical application of the theory of the strength and resistance of materials, together with the principles of the construction of roofs and arches.* One feature in the book which recommends it especially to the student of construction is the great number of practical examples by which the various formulæ are elucidated, and also the method of determining the *dimensions* of the different parts of a structure in order to fulfil certain conditions. We must, however, caution the student against expecting to find this work easy of comprehension: there is no royal road to the acquirement of any branch of science; and those who wish to understand the greater part of this treatise must first become masters of the elements of mechanics, geometry, algebra, and the differential calculus.

For the benefit of such of our readers as are not mathematicians enough to read the work for themselves we proceed to give a brief summary of the various subjects which are discussed therein.

Resistance to Extension and Compression.—It is found in practice that most substances used in construction may be said to be *perfectly elastic*, provided the straining or compressing force to which they are subjected does not exceed a certain limit; that is to say, they will return to their former volume and shape immediately the force is removed. But if the strain on a body is pushed beyond a certain limit, the body takes a *permanent set*; its interior structure becomes changed and its strength weakened. The transition to this state is called the *limit of elasticity*. As long as the straining force for each square inch of section (S) does not pass the limit of elasticity, the extension or compression (l) of a prism whose original length is L bears a constant ratio to the force S; if we call the constant E, then we have $l : L :: S : E$. E is called the *modulus of elasticity* of the body, and is found by experiment and tabulated for every kind of material. The constant E is in fact the force necessary to elongate a prism whose section is 1 square inch, by a quantity equal to its original length, or to compress it to one-half its original length; not that this is generally possible, but it is a convenient term for calculation. If A is the sectional area of the prism in inches, P the straining force, then $l = P \cdot L \div E \cdot A$, and also $P = E \cdot A \cdot l \div L$, or $P = A \cdot S$. Or, avoiding algebraical formulæ, the elongation or compression produced in a prism by any straining force or weight, is found by multiplying that weight by the length of the prism, and also multiplying the sectional area of the prism in inches by the modulus of elasticity, and dividing the former product by the latter. For example, what extension will be produced in a round bar of iron, 3 inches diameter and 400 inches long, by a weight of 84,000 lbs. suspended at one end; the modulus of elasticity being 28,000,000 lbs., and the weight of bar 480 lb. per cubic foot. Here the weight of the bar is 785¼ lb., which must be added to the weight 84,000 lb. suspended at one end, giving 84,785¼ lb. to be multiplied by 400, the length of the bar, or 33,914,112 for the dividend: the sectional area of the bar is 7·07, which, multiplied by the modulus of elasticity, gives 197,960,000 for the divisor; and performing the division, we find the extension produced to be ·171 of an inch.

When the force S is such that fracture is about to ensue, it is called the *coefficient of absolute strength*. There is also a *coefficient of safety*, which is the amount of strain that can safely be applied permanently to a body, and its ratio to the *coefficient of absolute strength* varies in different materials: in wrought-iron it is as 1:3, in cast-iron (steady load) as 1 : 4, in timber as 1 : 10, in stone and brick as 1 : 8.

Tables are given in Mr. Fenwick's book of the values of S in different materials for resistance, both to crushing and to stretching. The values there given appear to be the same as those which Mr. Eaton Hodgkinson deduced from his experiments. In trying experiments on wood, Mr. Hodgkinson found that, if the specimens were soaked in water, they lost half their strength of resistance to crushing.

Resistance to Flexure.—If a beam be fixed in a horizontal position, and subjected to a vertical strain, it will assume a curved form: the fibres of the convex part will be elongated, and those of the concave part will be compressed. There must exist some part where the fibres are neither elongated nor compressed; and this part is called the *neutral surface* of the beam; the line in which it is intersected by a cross section being called the *neutral axis* of that section.

If the resistances to extension and compression are proportional to the forces of extension and compression, and if the resistance to extension equals the resistance to compression, then the neutral axis of any vertical cross section will pass through the centre of gravity of that section. Experiments have shown that this hypothesis is a correct one up to certain limits, which ought never to be exceeded in practice. When the resistances to extension and compression are different, the relation between the parts into which a cross section is divided by the neutral axis and the forces of extension and compression is determined by the equation $A \cdot x \div A' \cdot y = E' \div E$; in which E and E′ are the *moduli of elasticity* of the extended and compressed fibres respectively; x, the distance of the centre of gravity of the upper part of the cross section from the neutral axis; y, that of the lower part; A, the area of the former; A′ that of the latter.

Moment of Resistance to Transverse Strain.—When a force acts at the end of a lever or arm, of which one point is fixed, the product of the force into the perpendicular from the fixed point on the direction of the force, is called in mechanics the *moment* of that force about the fixed point. The *moment of inertia* of a particle is the product of its mass into the square of its distance from a fixed line: the *moment of inertia* of a body about any line is the sum of the *moments of inertia* of its particles, and is found by means of the integral calculus. Now, in order that there may be equilibrium between the force P acting transversely to a beam, and the interior forces of any cross section, the moment (M) of P about the neutral axis must equal the sum of the moments of the interior forces taken about the same neutral axis. This equilibrium is expressed by the equation $M = E \cdot I \div r$, I being the *moment of inertia* of the section relative to the neutral axis, r the radius of curvature at the section. If S is the permanent force of extension or compression which each unit of surface of the cross section can support with safety at a distance x (the distance of the extreme fibre of the section) from the neutral axis, then the equation becomes for permanent constructions, $M = S \cdot I \div x$.

These formulæ will in general be sufficient for the solution of all the ordinary cases which occur of transverse strain, when the strain is kept *within the limits of safety*.

The Exterior Forces.—In order to apply the foregoing results it is necessary to find an expression for the moment of flexure in terms of the exterior forces; this varies according to the manner of fixing the beam.

1. Let a beam of length l be fixed at one end and loaded at the other; the moment of the strain on the section of fixture is $M = W \cdot l$. If the load is uniformly distributed along the whole length of the beam, it will bear double the weight that it will bear if hung from one end.

2. A beam AB is supported at the two ends horizontally, and loaded at any point C; in this case $M = W \cdot AC \cdot BC \div AB$. If C is the centre of the beam, $M = \frac{1}{4} W \cdot AB$, in which case the moment of the strain is greatest.

3. A beam AB is supported and loaded as before, to find the moment of the strain about any other point D of the beam: in this case it is found that $M = W \cdot AC \cdot BD \div AB$.

4. A beam AB, supported as before, is loaded with a weight uniformly distributed; to find the moment of the strain, at any point C: in this case we find $M = \frac{1}{2} W \cdot AC \cdot BC \div AB$.

If C is the centre of the beam, then $M = \frac{1}{8} W \cdot AB$. Hence it follows that the strain *on any point* of a beam by a weight uniformly distributed is the same as that produced by half the same weight suspended from that point.

Applications.—In order to apply the previous formula, we must equate the moment of the exterior forces with the moment of resistance of the beam.

Now the moment of the exterior forces is $M = m \cdot W \cdot l$, where m is a coefficient depending on the disposition of the load. And the moment of resistance to the beam is $S \cdot I \div x$. Therefore $m \cdot W \cdot l = S \cdot I \div x$.

The following are some of the values for m:—

1. Beam fixed at one end and loaded at the other, $m = 1$.

2. Ditto, ditto, and uniformly loaded, $m = \frac{1}{2}$.

3. Beam supported at both ends and loaded in middle, $m = \frac{1}{4}$.

4. Ditto, ditto, and uniformly loaded, $m = \frac{1}{8}$.

When the section of the beam is a rectangular, $I = \frac{1}{12} b\, d^3$; where b is the breadth and d the depth of the section; also $x = \frac{1}{2} d$, therefore $W = \frac{1}{6} S \cdot b \cdot d^2 \div m \cdot l$. Or, avoiding algebra, to find the breaking weight of a rectangular beam supported at both ends and loaded in the centre, multiply the breadth by the square of the depth in inches, and the product by one-sixth of the tabulated *co-efficient of fracture* for the particular material of which the beam consists, and divide this product by one-fourth of the length of the beam in inches. For example:—a rectangular beam of elm, 10 inches deep and 8 inches broad, rests on two supports 10 feet apart: find the breaking weight suspended at the centre, the *co-efficient of fracture* being 7850. Here the dividend is the product of 8, by 10 times 10 or 100, by one-sixth of 7850 or 1308⅓; and the divisor is one-fourth of 120 inches, or 30 inches; this gives the breaking weight 34,889 lb.

Solids of equal Resistance.—If instead of the beam having a constant section, we have one whose cross section is so varied that S shall be constant in all the sections, then the body is called a *solid of equal resistance*.

Suppose the sections are all rectangles of uniform width, but the height variable from middle to end, the beam resting horizontally on supports at its ends and uniformly loaded; it is proved that in this case the vertical section from end to end should be an ellipse, in order that resistance may be the same for every section.

* "The Mechanics of Construction." By Stephen Fenwick, F.R.A.S., of the Royal Military Academy, Woolwich. Bell & Daldy. London. 1861.

If the height of the beam remains constant, and the breadth varies, the horizontal section from end to end is shown to be a parabola, in order that the resistance may be the same for every section; the vertex of the parabola being at the middle point, and the two sides being symmetrical.

Deflection of Beams.—The determination of the *deflection* of a beam under a given weight is in some cases of more importance than the finding of its breaking weight. To obtain a solution of this problem, the moment of the resistance of the beam must be expressed in terms of the *radius of curvature* of the *neutral line* of the beam, and of its *coefficient of elasticity* (E). From this we obtain the equation, *deflection* $= W \cdot l^3 \div 48\,E \cdot I$, where l is the length of the beam, and the weight W is hung from the centre of the beam. When the same weight is uniformly distributed over the whole length of the beam, the deflection is $\frac{5}{8}$ of that produced when the weight is hung from the centre. There is misprint here in the book, which just reverses this result as obtained from the formulæ.

When the section of the beam is rectangular, b the breadth, and d the depth, then $I = \frac{1}{12}\, b \cdot d^3$, and therefore *deflection* $= \frac{1}{4}\, W \cdot l^3 \div b \cdot d^3 \cdot E$. In order to find the *deflection* caused by a weight hung from the centre of a beam of any material, multiply the cube of the length in inches by one-fourth of the given weight for a dividend; and also, multiply the breadth by the cube of the depth in inches; and this product by the modulus of elasticity, for the particular material of the beam, for a divisor: the result of the division will be the *deflection* in inches, or parts of an inch. For example:—a rectangular beam of oak, 10 feet long, 10 inches broad, and 12 inches deep, rests horizontally on two supports at its ends: to find the *deflection* caused by 35,000 lb. hung from its middle, the modulus of elasticity being 1,492,000. Here the dividend is 120 times 120 times 120, or 1,728,000, multiplied by 8750; and the divisor is 10 multiplied by 12 times 12 times 12, or 1,728, multiplied by 1,492,000: the result of the division is ·586 of an inch for the *deflection* in the centre of the beam.

Resistance to Torsion.—When a prism is subjected to exterior forces tending to *twist* it about its axis, the *angle of torsion* is that which two lines originally parallel, and passing through the centres of the two cross sections indefinitely near to each other, make between them after the twisting of the prism. In the case of a cylindrical shaft, it is found that the *angle of torsion* is directly proportional to the sum of the moments of the exterior forces, and to the distance between the extreme ends of the cylinder.

Resistance of Columns.—Under this head the author merely gives Mr. Eaton Hodgkinson's formulæ for cast-iron columns, published in the year 1840, an account of which will be found in the *Builder*, vol. XI. p. 532. But Mr. Fenwick has omitted to notice that, from more recent experiments, of which the results were published in 1858, Mr. Hodgkinson has found it necessary to modify his previous formulæ, the later experiments having been made on larger pillars than were used in the earlier. A notice of these experiments appeared in the *Builder*, vol. XVI. p. 531, and the formulæ are given below, together with those of 1840, as mentioned by Mr. Fenwick.

	Formula of 1840.	Formula of 1858.
Hollow cylindrical column	$W = 44{\cdot}3\,\frac{D^{3{\cdot}6} - d^{3{\cdot}6}}{l^{1{\cdot}7}}$	$W = 42{\cdot}3\,\frac{D^{3{\cdot}5} - d^{3{\cdot}5}}{l^{1{\cdot}63}}$
Solid ditto.....	$W = 44{\cdot}1\,\frac{D^{3{\cdot}6}}{l^{1{\cdot}7}}$	$W = m \times \frac{d^{3{\cdot}5}}{l^{1{\cdot}63}}$

Where W is breaking weight in tons, D and d the external and internal diameter in inches, l the height in feet, m a constant varying in different kinds of iron from 49·9 tons to 33·6 tons, the ends of the columns flat, and the height exceeding thirty times the diameter. In order to facilitate the application of these formulæ, we have calculated by logarithms the values of $D^{3{\cdot}5}$ and $l^{1{\cdot}63}$ for a few cases, similar tables being given for $D^{3{\cdot}6}$ and $l^{1{\cdot}7}$, in Mr. Hodgkinson's work on cast-iron, published in 1840, p. 336.

Powers of Diameters in Inches.		Powers of Lengths in Feet.	
$2^{3{\cdot}5}$	= 11·31	$5^{1{\cdot}63}$	= 13·78
$3^{3{\cdot}5}$	= 46·77	$10^{1{\cdot}63}$	= 42·66
$4^{3{\cdot}5}$	= 128	$15^{1{\cdot}63}$	= 82·61
$5^{3{\cdot}5}$	= 279·5	$20^{1{\cdot}63}$	= 132
$6^{3{\cdot}5}$	= 529	$30^{1{\cdot}63}$	= 255·7

An example will show how to make use of these tables and formulæ. A circular hollow column of cast-iron is 4 inches external and 2 inches internal diameter, the length 10 feet, to find its breaking weight. Here the dividend is formed by subtracting 11·31 from 128, and multiplying the result by 42·3, which gives 4936; divide this by 42·66, and we obtain 115¾ tons as the breaking weight. If we calculate the same from the formula of 1840, we find the breaking weight to be 119¼ tons, so that for practical purposes it matters little which formula is employed. The weight with which they can be trusted in construction is a different thing.

Roofs.—The simplest kind of framed roof is that formed by two principal rafters held together at their feet by a tie-beam. In this roof the thrust along each rafter is $\frac{1}{4}$ W. cosec. a, and the horizontal thrust along the tie-beam is $\frac{1}{4}$ W. cot. a; W being the total weight on each pair of rafters, and a the angle which the rafters make with the tie-beam. By the term "cosec. a," is meant the length of the rafter divided by the height from the tie-beam to the apex of the roof: "cot. a" is the half span of roof divided by the height: if the former is multiplied by one-fourth the total weight on each pair of rafters, we get the *thrust along each rafter;* and if the latter is multiplied by one-fourth of the same weight, we get the *horizontal strain along the tie-beam.* The tie-beam, when of timber, is generally required to carry the weight of a floor or ceiling, so that, in estimating the strain on it, the thrust of the rafters need not be considered, as the tensile strength of the beam is much greater than is required to resist their horizontal thrust. But when it is used only for the purpose of a tie, a very light beam suffices, as the resistance of timber to tensile strain is very great. In such case, however, an iron rod is generally employed, the dimensions of which for different spans are given in the *Builder*, vol. XI. p. 771.

The next form of trussed roof is called the king-post roof, in which the rafters may be stiffened by struts resting on the foot of the king-post. The compression on each strut is $\frac{1}{8}$ W cosec. a. If W′ is the weight of the tie-beam and whatever it carries, W″ that of king-post and struts, then the *tension of the king-post* $= \frac{1}{4}\,W + \frac{1}{2}\,W' + W''$

In finding the thrust of each rafter the tension of the king-post must be added to the vertical weight laid on the rafter, and this resolved in the direction of the rafter gives the *thrust of rafter* $= \frac{1}{2}\,(\frac{1}{2}\,W + \frac{1}{2}\,W' + W'')$ cosec. a. And the *thrust along the tie-beam* $= \frac{1}{2}\,(\frac{3}{4}\,W + \frac{1}{2}\,W' + W'')$ cot. a.

The foregoing results may be stated in words without the use of algebraical symbols. To find the *compression on each strut* of a king-post roof, multiply the length of the rafter by one-eighth of the total weight laid on each pair of rafters, and divide by the height of the roof. To find the *tension of the king-post,* add together one-fourth of the total weight laid on each pair of rafters, one-half the weight of the tie-beam and any floor or ceiling which it carries, and the weight of the king-post and struts. To find *horizontal thrust along the tie-beam,* add together the weight of king-post and struts, with one-half that of the tie-beam and floor which it carries, and three-fourths of the total weight laid on each pair of rafters; multiply the sum by one-fourth the span of the roof, and divide by the height.

Other forms of roofs are also treated of in the work.

The Arch.—In order to ascertain the strength of an arch constructed of stones cut in a wedge form, it is necessary first to discover the mode in which the arch is most likely to rupture. The mode of fracture to which the circular arch is most commonly exposed is by dividing into four pieces. The crown settles down and the haunches spread out; there are thus three points of fracture; the vertical joint at the crown opens at the intrados, and the haunches at the extrados. Another but rather uncommon mode of fracture ensues from the sliding of the upper voussoirs down their joints; but this is generally prevented by the friction of the surfaces. There is a third mode of fracture by rotation in Gothic arches, and in circular arches lightly loaded at the crown and overloadad at the haunches; namely, by the crown rising and the haunches falling in, in which case the vertical joint at the crown opens at the extrados and the haunches at the intrados. But this mode of fracture is very uncommon. The method used in investigating the stability of the arch is to take the half-arch from the springing to the crown, and let N be the horizontal thrust at the crown of the other half, P the weight of the half arch; and since the tendency is to turn round a point at the haunches on the intrados, we must take the moments of these forces about that point, and in order to have equilibrium we must have $N.y \not> P.x$, x and y being the length of the lever arms of P and N about that point.

Since the tendency of the horizontal thrust, N, is to cause the semi-arch to turn round the outer edge of the pier, therefore, in order that equilibrium may exist between the semi-arch and pier, the moment of N must be less than the sum of the moments of the semi-arch and pier: all these moments being taken about the point on which there is a tendency to motion.

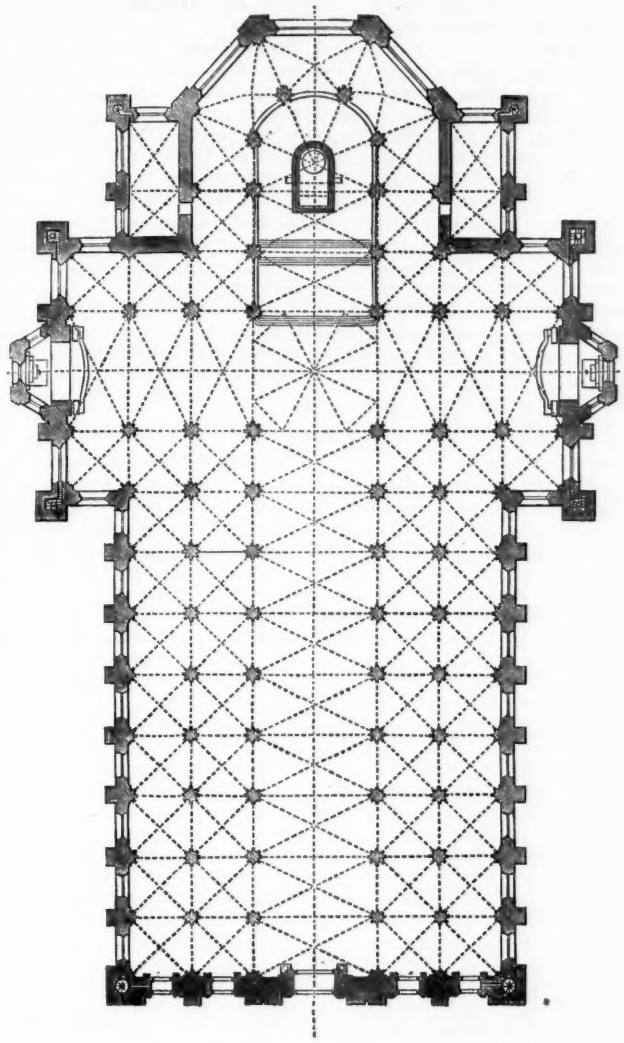
For the investigation of the practical formulæ for the stability of the arch and pier, the reader is referred to the work itself, in which the subject is thoroughly examined in a manner more practical than we have usually found it in other treatises, and many examples are given of the application of the formulæ. It is stated that the greatest horizontal thrust on a circular arch is at the haunches; the corresponding joint making an angle of 60° with the vertical.

The conditions of equilibrium in the elliptic arch are deduced from the circular arch, since the horizontal thrust of an elliptic arch is nearly that of a circular arch of same span; but whose vertical depth exceeds that of the elliptic in the ratio of the semi-major axis to the semi-minor axis of the ellipse, the two arches being loaded in the same manner.

Suspension Bridges.—In the concluding chapter are investigated the nature and properties of the curve taken by a chain suspended loosely from two points, the curve being called the *catenary.* When the chain is of uniform thickness and density, the curve is called the *common catenary,* in which the tension at any point is proportional to its distance from a horizontal line, called the *directrix,* placed at a certain depth below the chain: the tension is least at the lowest point, and is the same for two points on the same horizontal line. When the chain is of uniform density, but of strength varying according to the tension, the curve is called the *catenary of equal strength.* The problem which is approximately that of suspension bridges, is the finding the equation of the catenary when the weight of each element of the curve varies as the horizontal projection of that element, the solution of which shows that the curve is in that case a parabola. Several examples are given in this chapter of the practical application of the theory of the catenary to the suspension bridge.

We cordially recommend Mr. Fenwick's book to the attention of architects, and especially of architectural students, who will be amply repaid for any pains the study of it may cost them.

PLAN OF MILAN CATHEDRAL.



Scale, 100 *feet to an inch.*

PLAN OF MILAN CATHEDRAL.

With reference to the notice of Mr. Beresford Hope's interesting work, "The English Cathedral in the Nineteenth Century,"* which appeared in our columns, we were favoured with an engraved plan of Milan Cathedral, of which use was not then made. We take an opportunity that now occurs to insert it. Commenced in 1385, consecrated in 1418, and finished about 1440, Milan Cathedral is called by Mr. Fergusson the largest of all the Mediæval churches, covering 107,782 feet. It is certainly the most gorgeous, though far from the most beautiful. The plan was given by Mr. Hope as affording a striking example of a feature advocated by him, namely, a chevet, or aisle round the eastern apse, the convenience of which is not to be questioned. It is here carried round the apse without any diminution of the width of the internal nave and choir aisle of which it is the prolongation.

Mr. Hope's book contains much that deserves the most serious consideration of all church-builders.

A FURTHER REVIEW OF BLOTS IN SHEFFIELD.†

Street scavenging appears to be but imperfectly applied at Sheffield. The streets are partially swept before the shops are open in the morning; consequently, when these are to be cleaned out, the sweepings which are thrown upon the streets remain all day long, to be trodden into a thick greasy crust. Of this we had ocular demonstrations during our long perambulations of almost every street and road in the town. That some scavenage is actually performed, we are convinced, as we get near one of the four great deposit heaps of the corporation. Proceeding down Victoria-road past the Cattle Market, past the hide and skin market, under a railway arch, past a large open space, with heaps of coal-ash, and cinders, and broken bricks, in front of a row of three-storied houses, with street doors opening into the rooms, and a great ash-pit for all at the end of the row, we arrive at an area of nearly two acres in extent, completely covered by huge hillocks of filth. A special heap in one corner belongs to the Duke of Norfolk, as the sweepings of his grace's markets and properties are brought here, and upon which children, not pigs, are grovelling, whilst one infant sits playing with offal, and gnawing a decayed leek. We ascertain that the dispersion of these vile accumulations is left to the mercy and convenience of the farmers who buy them. We are told "they were never known to be so full as they are this year, because the agricultural season was late, and the farmers otherwise occupied." We must protest against this dangerous system of collecting the scavenage, and allowing it to rot in the midst of a town. Street scavenging is a most valuable institution, but it remains to perfect the mode in which it is carried out, and simply to remove the dirt from a large flat surface to heap it up in a smaller one is not the right way. There is no doubt that the scavenage forms a first-rate manure; but if it require keeping, let it be kept away from the nostrils of a hard-working population, whose trade is not too conducive to health. The system should be so ordered that, either by rail or canal, both of which are so ready at hand, the contractors should be obliged to remove the sweepings periodically, out of harm's way. The railway company to whom the deposit track belongs, appear to have found out that the manure business is a profitable one, as they have given notice to quit, or of an increase of rent. The scavengers must not be confounded with the "muck getters out," who buy and empty the contents of the swarms of private cesspools and privy pits from the persons who own them, and afterwards sell them at a profit,—these not coming at all under the authority of the corporation.

Leaving this neighbourhood, we skirt the canal basin, picking our way between mounds of sifted coal-ash, mill and engine coals, iron bars, steel bars, and lumps of bars in boxes,—a rusty, dusty, gritty place to remember,—passing the Corn Exchange,—a long colonnaded building, with a covered tribune in the centre; and presently come into High-street. This is the centre of the retail commerce. Here is Whelan & Whitty's cloth hall; there are Levy & Son's commercial buildings, having a façade like that of an East-end theatre; and here is Foster's tailoring establishment; with a fair proportion of hatters, bootmakers, hosiers, silversmiths liberally introduced between them. Like all the Sheffield streets, it is inconveniently narrow, improving but little in this respect when it takes the name of Fargate. Gray's Exchange drapery establishment, with a lofty arched arcaded entrance and Italian superstructure, was striking enough in its street effect to cause regret that there were not others of equal consideration. The rest of the shops, with perhaps the exception of Moses's large-paned frontage in Moses's usual grandiose style, are poor and dingy; and the dull, red-bricked, antiquated Assay Office might be well included in the latter category. The Cutlers' Hall is close by;—a heavy Classic building, which may have been thought sufficiently stately when it was first erected, but cannot now be considered to afford adequate accommodation. It contains a council-room, reception-rooms, kitchens, and a dining-room,—the latter adorned with portraits of the Earl Fitzwilliam and Lord Wharncliffe. At the annual cutlers' feast, the number of guests to be entertained is limited by the size of the dining-hall to 250; and, when the mayor and corporation gave their first dinner, last August, in the Free Library, they could not invite, to meet the borough members and master cutlers more than 80 guests; so it must be allowed that the civic and public hospitalities of a population exceeding 180,000 persons are but scantily provided for. The erection of a new hall, as broached at the latter banquet should not be overruled, for the implied necessary taxation which the mayor urged as a difficulty need not stand in the way. With the co-operation of the neighbouring nobility and gentry and the wealthy Sheffield manufacturers, the scheme might be carried out by means of subscription shares. The proper site is evident: raze the present so-called Town Hall, with the gin-palace at its side, and the great ash-pit in its rear, and any number of the tenements around it, and a new building corresponding with the still increasing importance and wealth of Sheffield would be a municipal, architectural, and sanitary improvement.

Modern commerce has swept nearly every ancient building out of Sheffield except the perpendicular parish church. This is in the centre of a large well-filled graveyard, now properly closed; but which when purified by time will be an airy open place for a town much in need of one. The shabby iron railings should be replaced with new, if only as a tribute to the wealth and benefits the parish has derived from metal; these, of an artistic character, with a few young trees, would brighten and beautify a spot in an important situation in view of High-street and the Cutlers' Hall. The Sheffield Savings Bank deserves a word for the clever way it has in some measure overcome the difficulty of a narrow street. It is a neat, substantial, and somewhat ornate Italian building, with a centre which is set back, and two side porticos which keep the line of houses. In Norfolk-row there is a large handsome Decorated Gothic Roman Catholic chapel, with transepts and spire, the effect of which would be much heightened by the removal of a low dirty little cigar divan, and a still dirtier little vegetable shop, occupying the important corner site into Norfolk-street. This is the boundary line of a parallelogram of rectangular streets in which the principal public institutions, the residences of the medical profession, large and small factories, a brewery, and railway receiving and order warehouses are situated. The same blotchy encrustations on the roads, and the same channels running across the footways, with liquid manure from houses and stables, are too frequent. Chapels are thick upon the ground in this quarter, exceeding for the various dissenting denominations forty in number in all Sheffield. A Wesleyan and Independent chapel opposite Harrison, Brothers, & Howison's (cutlers to her Majesty), are both but square roomy brick boxes, with stone fronts, but they set the commendable example of standing back from the street line behind railings. At the corner of Arundel-street the severe Assembly Rooms look askant at the blank, featureless theatre at their side. Then come the doctor's houses, Mr. Moseley, the advertising surgeon-dentist, being here, as everywhere else; Rollason & Son's meta

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* John Murray, Albemarle-street. 1861.

† See p. 641, *ante*. We take the opportunity to mention that Mr. J. G. Weightman (not Wilson) was the architect of the new works lately erected for Messrs. Joseph Rodgers & Son. The market of which we spoke was designed by Mr. Hadfield.

warehouse; Gillot's metallic pen depot; Drs. Shearman, Smith, and Elam, till at the corner of Tudor-street the Free Library stands confessed, externally, a miniature copy of the Reform Club, but so black! internally, in process of re-embellishment. The Smoke Act was partially applied to Sheffield some time ago, in so far as the smoking of chimneys was, as a compromise, limited to twenty minutes an hour; but even this half-and-half arrangement has been, by the *vis inertiæ* of the authorities, thrown overboard, and every chimney performs the part of a crater, unheeded. Smoke, assisted by the metallic dust raised by the process of grinding, and further aided by the porous nature of the stone, tones down every stone building to an indian-ink tint. The Philosophical Museum—all the more valuable and accessible for the learning and urbanity of the curator,—is also in this district, and a Music Hall, with Subscription Library, albeit, in the heavy joiner's Doric style, is, nevertheless, another useful institution. More surgeons,—Messrs. Porter, Perry, Willington, and Barber, and Dr. Bartolomé! past Truswell & Co.'s brewery, Walker & Hall's, electro platers and bronzers, Edward Hunter's, manufacturer of fine scissors, past the vile and dismal Froggate-lane, opposite Eyre-street Works, Lister & Co.'s railway receiving and order warehouse, past Corsaw, Denton, & Burdekin's, and the same preternatural silence reigns around. The "Shevvild chaps" have struck work for the day, and have besieged and taken the Botanical Gardens, where there is a brass band contest taking place.

A school of art was originated in the bygone days by poor Haydon, the painter, Dr. Harwood, and Mr. J. Jobson Smith, now president of the Chamber of Commerce. The latter of whom has happily lived to see the fruit of the seed thus early sown, not only in the material shape of a handsome new Romanesque red-and-black brick building, erected in 1855, but in the appreciation of the teaching by a large body of students, and its effect upon the artistic character of the manufactures. Perhaps the harvest may have been gathered in, so to speak, when the superiority of Mr. Smith's metallurgy was acknowledged in the late Sultan's orders for mantel-pieces and stove-grates at a price of a thousand guineas a piece. Inscribed in letters of gold, we observe in large tablets hanging on the walls of one of the principal rooms, the names of the annual mayors and annual master cutlers, who have awarded ten guinea prizes to the pupils who have produced the best designs of Sheffield manufacture, and the names of the fortunate recipients thereof. For the same purpose, and with equal incentive, a Norfolk prize has been instituted.

At the poorer extremity of this same parallelogram, we perceived a notification of "a working man's college and penny savings bank," with a charge of "threepence per week for elementary branches." It would be well if sanitary science were studied at this and similar Institutes. This would be the more desirable, because in Sheffield there are many working men who are freeholders of small properties, and who systematically oppose sanitary improvements for fear of extra taxation. If they could be brought to see the wisdom of giving a penny to save a pound, buying health instead of paying to be cured of disease, our end would be in great measure gained. All this neighbourhood dips down to the valley of the Porter and the Ponds into which the natural drainage must necessarily descend; and stand ingat the side of the alcoved apse of St. Paul's Church, at the head of Howard-street, under the shadow of the dome-covered tower, and thinking of this, the pale cholera monument looking down from the hill opposite, seems like an admonition.

The "Shevvild Chap's" penny song says:—

"S stands for Surrey Music-hall, with its decorations fine,
That baffles all description, and our theatres far outshine.
T stands for talent there employed to try to please each night,
And when our approbation gain, they meet it with delight."

Among ham and beef shops, oyster shops, and cigar divans, next door to a pawnbroker's and at the corner of Workhouse-lane, in West Bar, is the establishment thus eulogized. Like Holder's Music-hall at Birmingham, from small beginnings the proprietor, Mr. Youdan, by getting the favour of the working men, has been enabled, with the result of their patronage, to erect this building, capable of accommo lating 4,000 people. On payment of 6d. the visitor is free to boxes, pit, museums under the pit, and dancing-room under the stage; 4d. admitting him only to the gallery. Entering a lofty saloon, on one side of which is a large gaudy refreshment stall and tavern bar, we find our way into the so-called music-hall, which, in construction, is a theatre. It is crammed full of an audience of men, women, and children, enveloped in a stifling haze of tobacco smoke. We should have been glad to have found a higher class of entertainment than that afforded by the bill of fare,—"A female Blondin, double trapeze, globe perche, barrel dancer and clown, highly-trained dogs, bottle and chair performer, tight rope dancing negro vocalist, and Paddy Carey in Irish character;" and would take this opportunity to impress upon the purveyors of the artizans' amusement the possibility of combining instruction with amusement. A little good music, judiciously introduced, *à la* Jullien, would lead the way to a preference for something more elevating. The museum contains a correspondingly heterogeneous collection of objects: Chinese implements, collected by Sir John Bowring; the Judgment of Solomon in life-size waxwork, in a glass case, the figures dressed partly in modern costume; coloured lithographs of fruit, landscape, and architectural subjects; stuffed beasts, reptiles, birds, and butterflies; framed testimonials to the proprietor, models of engines and men-of-war, and peep-holes into dioramas.

Another morning we visit this same locality by daylight, as it lies in our road to a crowded locality of working bees in the busy hive of Sheffield, and to the reservoirs from which the town is supplied with water. We find the streets as dirty as they were overnight: though well paved, the roads are covered with a thick, hard, cheesy crust, and with the loose sweepings of the shops: sawdust and other sweepings, have choked up the gutter gratings. The water provided for general use being of a colour we do not esteem nor envy, we are further bent on visiting the sources of supply to examine into their condition, in order to clear up certain doubts we entertain respecting them. From West Bar Green, into which six streets converge, the steep ascent begins which leads into the west country. The long irregular road, first called Tenter-street, is intersected with crofts and alleys which are full of small two-storied houses. In these the artisans reside, and in some of them carry on their trade. Old clothes-shops, old furniture shops, the shop of an optician calling himself "A Blessing to the Aged," rag and bone shops and petty hucksters, including "A Co-operative Store," make up a dingy line of thoroughfare. Up court No. 1 a cesspool is being emptied, the contents wheeled out, after nine o'clock in the morning, into the main street, and thence shovelled into a cart, causing a horrible stench: children newly washed and clean are playing round about the corrupt ashes, dung, and slime. In all the courts there is but one huge ash midden, into which the privies in common empty, for all the inhabitants. They are nearly all furnished after one type, with a public privy and a public——shudder. The small workshops are generally ill ventilated. Still ascending Tenter-street, past Wade, Wingfield, and Rowbotham's, up School Croft and down White Croft, where the channels from houses to gutter are all in great favour, and the roads gritty with fine ash, fine sawdust, and fine filings, till St. Vincent's Church and Schools present a clever and pleasing architectural contrast. An infant school, with a dry asphalt pavement and asphalt walls, is black outside and very narrow and dirty within: with too little light: a decorated Virgin and Child in a niche over the mistress's desk, affording a strong contrast, and, perhaps, by way of compensation, a large ashpit and cesspool in the high corner of the play-yard. From this to more Crofts, to S. Bacon's stag, bone, black buffalo and hard wood, haft and scale cutters, S. Gill's cutlery factory and clean whitened door-steps, and houses from Nos. 76 to 82 in Hollis's Croft, making way for a particularly clean court, No. 9, proving that all might be cleaner than they are; but even in this there were the common privies and the one huge ashpit; and still onwards, unmindful of the invitation implied by the sign-board "the Grinder's Rest;" past Burgen and Wells's black rickety steel works, and Beardshaw, Stevenson, & Co.'s, every here and there noting ashes thrown out of windows from little furnaces, and water soaking out of houses from wet grinding; past lodgings for travellers, where the toilets of women are performed within sight of foot-passengers; and past a neat Temperance Hall, 1855, to which a flight of twenty external steps is attached with but a very weak iron rail, which is evidently, for a crush, "marked dangerous." In Newcastle-lane another and still larger ash and privy pit was being emptied at mid-day; a Wesleyan drinking-fountain, with a thermometer and lamp attached to it, is on our road, inscribed "Rest for the Weary. James Montgomery, etat 80. Redhill Wesleyan Sunday-school Drinking Fountain and Montgomery Memorial. Whosoever drinketh of this water shall thirst again." Soon after this, and still ascending, the road breaks into St. George's-square, with St. George's Church in the centre of it—a modern late Perpendicular edifice, with a square tower, and flat roof with pinnacles. The Free Grammar School is also in St. George's-square. In the corner of the playground there is a group of ruined privies, close to a row of houses. The windows are broken, and the building generally not in good repair. At the corner of the square and Portabello-place, is the new-built factory of S. Laycock & Son, for hair-seating and curled hair, and C. Johnson Western's works, next door. Regent-street, farther on, is neat and clean, with little enclosed fore-courts; but every third house is detached by a passage, which the tenants of all must use to remove the contents of the common privies. St. George's National Schools, an immense establishment built at the angle of Beet-street, is by far the handsomest school building in the town. Three large school-rooms, with masters' houses between each, built of stone in the Norman style, with columns at the angles of walls and windows; with no lack of zig-zag, or billet ornament; and with, for the only drawback externally, a travestie of a Norman tower at one angle. Internally, a deficiency of light and room in the infants' class-room, is a grievance: bonnet and cloak places are wanted in lieu of the existing arrangement of hanging these all round the schoolroom:—and the great sore of open ashpits and privies prevails even here.

From this, through a suburban district of small villas and large houses, set back within well-ordered flowery grounds, climbing up a further ascent, we make our observations upon the first great dam or reservoir. Although on so elevated a site, the ground around is still higher and slopes towards it, and reeds and rank grass, and over-hanging trees, fringe the banks. There is a dam house close by, the well-stocked gardens of which must to some extent affect the purity of the water. The dead leaves are floating upon the surface, and in one bend, the corner nearest the garden, a thick slime was upon the waters. Moreover, ducks were swimming about in it. The next dam communicated by means of an open channel, from which a trough was filled; and horses and cattle were drinking from it in the corner of a field. Higher up, from dam to dam, and up to the great Hadfield reservoir, the same imperfections present themselves: banks that should be lined with sloping stones, and not an atom of decayed vegetation allowed to mix with the water, are planted to the water's brink with overhanging trees, and rank grass and weeds grow apace upon the shallow muddy shores. The highly discoloured and slimy state of the water may in like manner be attributed to the position of the dams, which admit of the land-drainage of higher grounds undoubtedly filtering into them.

We remember that the attempt to apply a Town Improvement Act, about five years ago, was frustrated by the artisans themselves, who, possessed of small properties, were afraid of extra taxation. Considering the pulmonary diseases to which the Sheffield workmen are especially liable, as fully described to them by Dr. Holland, a stanch sanitary reformer, in his work "On the Diseases of the Lungs from Mechanical Causes," it is a miracle that they do not jealously insist upon the removal of every other exciting cause of ill health. It is allowed that when the operatives, grinders especially, resided in the country, and had to walk daily to some distance to their workshops, which were once situate in rural places, on the banks of the streams which furnished the required water power, the mortality rate was not so high as it is now. The same liability to inhale dust while at work existed: the same constrained position while at work was maintained; the work-places were as ill-ventilated then as now; in fine, the same causes existed which are supposed to act deleteriously upon the present workmen's health. To what circumstance, then, should the excess in the mortality rate be ascribed? Simply that then the workman passed part of his time in *pure air*. Now, either in or out of the workshop, he breathes an atmosphere impregnated with excremental and putrefactive smells, and charged with dust. How can it be otherwise, when this immense concourse of persons live, eat, drink, and sleep in a space crammed with cesspits full of their own ordure, and where the contents of their heaped-up ash and offal middens are retained within sight and scent of their dwellings?

The result of these investigations prove that, although Sheffield possesses a medal of honour conferred at the hands of the Emperor of the

French, it is as devoid of the decencies of civilization as it was in the Dark Ages. We read of such a community with much the same feeling that we read of the benighted inhabitants of the Great Salt Lake city. Even in the Dark Ages such a condition of life as is existing at Sheffield would have been deemed "*an oppression by nuisances*:"—

"And if one person do lay timber, faggots, stones, lime, sand, grauel, dung, or any other thing, upon or against ye house of another, which do rot, putrifie, corrupt or impair the walls, timber, or other part of the same house, or any corrupt, noisome, or stinking thing, the sauor or smell whereof is offensive to the inhabitants of the same house and his family, that is an oppression of the same inhabitant."—(Fitz. Nat. Bre. 184.)

There is much to interest in Sheffield, much to praise, but our object on the present occasion is to point out what there is to amend.

REPORT ON DECAY OF THE STONE AT THE NEW PALACE AT WESTMINSTER.

The report of the committee appointed by the First Commissioner of Her Majesty's Works and Public Buildings, to inquire into the decay of the stone of the New Palace at Westminster, and into the best means for preserving the stone from further injury, with the minutes of evidence, has been published as a "Return to an Order of the Honourable the House of Commons, dated 1st of August, 1861," and can be obtained by the public in the usual way. The committee met thirteen times (between March 23rd and August 7th), irrespective of the meetings of sub-committees; examined thirty-one witnesses; and considered seventy-seven communications submitted to them. The following, addressed to the Right Hon. William Cowper, M.P., is their

REPORT.

Sir,—We, the undersigned, being the committee appointed "to inquire into the decay of the stone of the New Palace of Westminster, and into the best means of preserving the stone from further injury," have the honour to submit to you the following report, in which we have adopted, as the objects of our inquiry, the several points referred to by your letter of appointment and instruction,* viz.:—

"I. The extent and position of the decay.

"The causes to which it is attributable, taking into consideration the composition of the stone, and the influence exerted upon it by moisture, and by the acids diffused in the London atmosphere.

"III. The best means of preserving the stone from further injury.

"IV. The qualities of the stones to be recommended for future use in public buildings to be erected in London."

1. In proceeding with the important inquiry thus intrusted to this committee, we beg to state that we first made a careful inspection of the whole of the buildings; and that after this inspection we proceeded to obtain such evidence as appeared to us best calculated to facilitate the inquiry intrusted to us, by examining a considerable number of witnesses who had been connected with the building from the commencement, or who had been concerned in the various processes which had been actually tried for arresting the decay which had occurred; and also another class of witnesses, who had suggested various theoretical remedies for the same purpose.

2. We delegated to a sub-committee, specially appointed, an examination and inquiry into the condition of other buildings erected in the metropolis, in which magnesian limestone had been used; and we particularly called the attention of the scientific chemists, who had been appointed on the committee, to several points peculiarly within the limits of their acquaintance with chemical subjects.

3. We also considered it expedient to invite by advertisement the attention of chemists and others to the subject submitted to the committee; requesting that any plan or suggestion for the prevention of decay, or for arresting its progress, might be brought under our notice.

4. Having thus premised the course the committee thought it expedient and desirable to take; we now proceed to report *seriatim* on the subjects brought under our notice by your instructions, and in the order adopted therein.

I. *The Extent and Position of the Decay.*

5. It is extremely difficult to give any very exact account either of the extent or actual position of the decay. It seems from the evidence that it first began to make its appearance in the portions of the Palace at Westminster executed at the commencement of the building about seven years after their execution; and yet, in some of the most recently executed portions, viz., those towards Old Palace-yard, facing Henry VII.'s Chapel, the decay appears to be as obvious as in any other part of the building.

6. In the earlier works, viz., those towards the Thames, the decay is most apparent in the lower portion of the building; and in this portion the decay is confined to what may be called "zones," or general levels; which would seem to suggest that it depends as much upon position in the building as upon the use of particular beds of stone from the quarries employed.

7. The same remark applies to the part of the palace fronting the approaches to Westminster Bridge, where the decay of the lower portion is considerable; but, in the newest work, facing Henry VII.'s Chapel, the decay occurs in positions which are more varied, and under circumstances which it is exceedingly difficult to appreciate.

8. We have examined with much care the upper portions of the building; and we cannot perceive that the decay has made any important inroad upon those much more exposed portions, where decay might more reasonably have been expected. The decay, however, occurs again to a considerable extent in the inner courts, which are sheltered in a great measure from external influences; and, perhaps, the very worst specimen we have noticed is to be found in the small archway leading to the reporters' gallery, near the entrance to Westminster Hall; a part of the work as much sheltered as in the nature and circumstances of a public building it could well be.

9. The general result of our observations, confirmed by the evidence, would seem to suggest that the stone used in the palace of Westminster is much more likely to decay in damp and sheltered situations than where it is exposed to the full action of atmospheric influences. In the east and north fronts, before adverted to, the worst symptoms occur in the ashlar between the upper and lower mouldings of the plinth, and under the first cornice, where the exposure is inconsiderable; but the dampness, arising from the drip of the mouldings and from the action of capillary attraction, in cases where projections hold the moisture, appears to exercise an important influence on the condition of the stone itself.

10. It does not appear to us that the decay is attributable, as is commonly supposed, to the stones in the building not being placed upon what is technically called their natural bed, or in the same relative position as they occupied in the quarry: thus, stones which are found horizontally in the quarry appear to have been often placed perpendicularly in the building, and used for purposes of the most delicate decoration without any injurious result. As an instance of this fact, we may point out the elaborately carved shields of arms under the range of the first-floor windows: the stones used for these shields, though universally placed perpendicularly to their natural position in the quarry, present, so far as we are aware, few, if any, symptoms of decay.

11. The extent to which the decay on the whole surface has proceeded, it is not very easy to estimate. At the present moment the actual decay is, doubtless, considerable for a building so recently erected; but the change of colour in the stone itself, and the "fretting out of the surface," which are suggested as the first symptoms, lead us to apprehend that there may exist much more mischief than at present is actually apparent.

12. One of the witnesses examined, however, and whose judgment as a practical man is of considerable value, is of opinion that the decay, after proceeding to some depth in the stone, stops of itself; that an induration of the surface takes place, and that no further decay ensues. The committee would willingly accept this opinion, if they considered it well founded; but they cannot conceive that it is true to any considerable extent, notwithstanding there may certainly be some few indications which lead to the belief that in some cases it may be correct.

13. At present the decay appears for the most part on the plain surfaces, whilst the finer and more elaborately-wrought portions of the building, unless under projections, are not seriously affected. And however disappointing and disfiguring these defects may be, especially in a building so recently erected, the committee are of opinion that at present the decay does not affect the stability of the structure.

II.—*The Causes to which the Decay is attributable.*

14. This part of the inquiry naturally leads to a reference to the evidence which has been obtained by the committee on the subject of the stone itself. The result of this evidence may be thus briefly stated. The stone recommended by the commissioners for this building was that from the quarries of Bolsover Moor and its neighbourhood; and this stone was actually contracted for in the first instance. Before the work began, however, it was found that blocks of sufficient size could not be procured from those quarries; and in consequence, one of the commissioners was appointed to proceed to the spot, to ascertain whether other quarries might not be discovered furnishing stone in beds of greater thickness and of larger dimensions. These conditions were found in the quarries at Anston, and the stone of greater thickness procured from these quarries has been used not only in this building, but in all the other buildings constructed of magnesian limestone in the metropolis, after the quarries of Bolsover Moor had been abandoned, for the reason above stated.

15. The recommendation of the Bolsover stone in the report of the commissioners was founded on its similarity to that used in the Norman portions of Southwell Minster, which were stated in the report to be in a high state of preservation. Evidence has since been adduced, in a letter from Mr. Scott, to be found in the Appendix, which renders it probable that the stone of this Minster was really obtained from the ancient quarries at Mansfield Woodhouse. The latter quarries were reopened, and a considerable quantity of stone from them (exceeding 20,000 cubic feet) was made use of in the Palace at Westminster; but in their turn they were relinquished, from dissatisfaction as to the size of the blocks, though we have it on evidence, confirmed by our own observation, that the stone used from these quarries has stood remarkably well.

16. The evidence brought before your committee on the subject of the stone obtained from the Anston quarries is very conflicting; the contractor and his principal foreman stating that the stone was, with slight exceptions, extraordinarily good; while other witnesses maintain that even in the quarries themselves there are stones in a state of actual decomposition; and one very important witness, a foreman employed at the Palace at Westminster, asserts he knew that certain beds in some of the quarries were liable to decay, and that he abandoned them in consequence. With reference to the selection of stone, the committee venture to remark, that it is much to be regretted that the offer made by one of the commissioners, particularly well acquainted with the selection and working of stone, to examine that used in the Palace at Westminster for the moderate salary of 150*l.* per annum, was not accepted; owing to some difficulty in regard to the party who was to be held responsible for this unimportant amount; and that the matter was left to persons who admit they had little or no prior experience of this description of stone, though they evidently entertained suspicions of the durability of some of it which they were employing.

17. With reference to the very natural and important question of the actual causes of the decay of this stone when exposed to the London atmosphere, the committee take the liberty of referring to the report of the chemists, who were members of the committee, to whom this question was specially referred. This will be found in the Appendix.

III.—*The best Means of preserving the Stone from further Injury.*

18. This part of the inquiry referred to the committee naturally divides itself into two ques-

* The letter of appointment and instruction was addressed, — "To Sir Roderick Impey Murchison, G.C.St.S., D.C.L., LL.D., F.R.S., Director-General of the Geological Survey of Great Britain; William Tite, esq., M.P., F.R.S., President of the Royal Institute of British Architects; Sydney Smirke, esq., Royal Academician, architect; George Gilbert Scott, esq., Royal Academician, architect; George Godwin, esq., F.R.S., and Matthew Digby Wyatt, esq., vice-presidents of the Royal Institute of British Architects; Augustus William Hofmann, esq., LL.D., F.R.S., Professor of the Royal College of Chemistry; Edward Frankland, esq., F.R.S., Professor of Chemistry at St. Bartholomew's Hospital; Frederick Augustus Abel, esq., F.R.S., Chemist to the War Department; David Thomas Ansted, esq., M.A., F.R.S., Professor of Geology; James Tennant, esq., Professor of Geology at King's College, London; George Rowdon Burnell, esq., civil engineer; Thomas Hawksley, esq., civil engineer; Charles Harriott Smith, esq., one of "the Commissioners for the selection of the stone for building the Houses of Parliament;" and Edward Middleton Barry, esq., Associate of Royal Academy, and architect in charge of the Houses of Parliament; the committee appointed by the First Commissioner of her Majesty's Works and Public Buildings to inquire into the decay of the stone of the New Palace at Westminster, and into the best means for preserving the stone from further injury." Mr. Alfred Bonham-Carter acted efficiently as secretary.

tions;—namely, as to the steps that have hitherto been taken, whether experimentally or otherwise; and as to those that are to be recommended for adoption hereafter. With regard to the first question, we have ourselves examined with care the result of what has been done at the Palace itself, either experimentally on the river front, or, as in the inner courts, by actual coatings or washings over large surfaces. With regard to the second question, our inquiries have been earnest and elaborate, and we have examined many witnesses and given much time to the consideration of the various propositions obtained by advertisement or otherwise. As will be seen in a subsequent part of the report, we finally referred this question to the further consideration of the professional chemists who were on the committee.

19. On the first question, the committee are decidedly of opinion that it is not necessary nor desirable to proceed with any general coating, painting, oiling, or washing of the whole building. It is quite obvious, in their judgment, that a very large proportion of the stone does not require any such application; but that what is wanted is some efficient process which should be applied to the surface of any stone that begins to show symptoms of decay, with a view to arrest its progress. The committee believe, that the persons to whom the care of the building is entrusted ought to watch it, and note, in the very earliest stages, wherever decay is perceptible, by efflorescence, change of colour, crumbling, or slight decomposition.

20. In cases where the decay is important, and evidently occasioned by the fall of rain on an upper projecting or exposed surface, protection should be afforded by a covering of sheet zinc or lead; and if, hereafter, any composition should fortunately be discovered, by which the decaying stone could be at once covered or coated, and the injurious influences of the atmosphere prevented from further acting upon it, the difficulty would be solved. In some extreme cases, the decayed stone might be cut out, and replaced by a new one. With regard to the processes which have actually been applied, whether experimentally or extensively, your committee are decidedly of opinion that the discovery of a proper mode of treating stones in a state of decay has not yet been made; and there is no evidence whatever on the building itself to induce them to believe that the decay, where decay has arisen, has been arrested, or that permanently the decay has been prevented, by any of the processes yet applied.

21. With reference to the second question, we found ourselves unable, after much labour, to come to any definite conclusion; and we finally requested the chemists in the committee to examine and report upon it; but those gentlemen state, as appears by their report in the Appendix, that the nature of the inquiry is so extensive, and that time is so important an element in the solution, that they are unable to give any opinion upon the subject. They further state, that they spent five whole days in the examination of only one suggested remedy; but they are unable, notwithstanding, to give any opinion on even that one suggestion. They allude to secret processes, regarding which they say they can offer no opinion; but they express a doubt of the applicability of any suggestion which would demand the veil of secrecy for protection. Concurring in this view, it may be further noted that even if such applications were found successful in sample or experiment, no security would be afforded for a corresponding success in any subsequent large operations. They recommend that a series of experiments should be conducted, under chemical supervision, for a considerable period of time; and the committee are most reluctantly compelled to coincide with them, and to urge upon the Government the adoption of such a course.

IV. "*The Qualities of the Stones to be recommended for future Use in Public Buildings to be erected in London.*"

22. On this head of the inquiry the committee have been unable, in the time allotted to them, to go into any very extensive examination. It is obvious, however, that although some varieties of magnesian limestone are an excellent and durable material, when not exposed to the deleterious influences of the London atmosphere; yet that in London it is subject to causes of decay, which render it an undesirable and unsafe material for the construction of public buildings.

23. It is equally obvious that Portland stone, well selected, has been used in buildings in London from the date of St. Paul's downwards, under circumstances of great exposure, and with most successful results. Portland stone is a material to be obtained in any quantity, and in blocks of any size, beautiful in colour and texture, reasonable in price, not by any means so hard as the Anston stone, and yet with a power of resisting the influences of the London atmosphere, that leaves but little to be desired. It must be remarked, however, that Portland stone should be carefully selected; an operation which would be the most satisfactorily effected by an agent at the quarries.

24. On this subject the commissioners could of course bring much personal experience to bear; but, after the valuable explanation of the principles upon which the decay of stone depends in populous places, as given by the chemists, in their report before referred to, the committee refrain from repeating those conclusions; in which, however, they entirely concur.

25. During the inquiries of the committee, one of their members, Mr. Burnell, who is well acquainted with architectural and engineering works in France, undertook, at his own expense, a journey to Paris, to inquire into the practice of the French architects engaged in the Government works in that metropolis. There, the stone used, the "calcaire grossier," though a carbonate of lime of tertiary age, and therefore of very different mineral composition from our magnesian limestone of the much older Permian age, seems to suffer also from decay in a comparatively pure atmosphere, and where wood is chiefly used as fuel.

26. From the evidence of Mr. Burnell, it does not appear that French architects or chemists have been more successful than ourselves, either in the use of materials not subject to atmospheric influences, or in the application of processes for arresting decay when it has once begun. The opinions of the most scientific chemists and architects in France on this subject have, however, in this way, been obtained; and it is extremely probable that the inquiries undertaken by them, simultaneously with those undertaken in this country, may hereafter lead to some successful result.

27. The committee have to thank the Government for the facilities given to Mr. Burnell in this important part of the inquiry, by providing him with an introduction which obtained for him the active assistance of her Majesty's ambassador at the court of the Tuileries.

28. The committee delegated, as before stated, to a sub-committee, the duty of examining the various buildings in London in which magnesian limestone from the Anston quarries has been introduced in the external architecture. The report of this sub-committee forms part of the appendix; and we beg to refer to that report as confirmatory of our opinion of the uncertain character of magnesian limestone, and the risk attending the use of it in London.

29. In conclusion, the committee venture to recommend that the architect of the Palace of Westminster, assisted by scientific chemists, should examine and record the actual state of the stone work of the building at the present moment; that experiments should be made by their direction, under various conditions of height, exposure, and aspect, with such preservative materials and agents as the chemists may suggest from time to time; and that researches should be continued into the effects of the various alkaline silicates, the phosphates, and other substances which have been brought under the notice of the committee, or suggested in Germany, France, or elsewhere; that where decay arises from damp, means should be taken to protect the stone, as has been before suggested; that any stone extensively decayed should be removed and replaced; but that in particular the earliest symptoms of decay should be carefully watched, and examined, with the view to the application of some immediate remedy. The committee believe that a very large portion of the stone in the Palace of Westminster is of a very durable nature; and they entertain a confident expectation that a remedy will soon be found to arrest or control the decay when it has unfortunately begun to appear.

William Tite.
Rod. I. Murchison.
Sydney Smirke.
George Gilbert Scott.
George Godwin.
M. Digby Wyatt.
A. W. Hofmann.
E. Frankland.
F. A. Abel.
James Tennant.
George R. Burnell.
Thomas Hawksley.
Charles H. Smith.
Edward M. Barry.
Alfred Bonham-Carter, Secretary.

Report of Sub-Committee, of Chemists, referred to in the foregoing: and addressed to Chairman of the Committee.

17 June, 1861.

Sir,—We have the honour to inform you that we have complied with the wishes of the committee, by examining into the several proposals which have been laid before them for the preservation of the stone of the New Houses of Parliament; and that we have arrived at the following conclusions:—

1. Amongst the processes proposed, varying in principle and value to a very considerable extent, there is not one which we at present feel justified in proposing that the committee should definitely recommend as a preservative, either for general or local application.

2. A minute examination into one class of processes, submitted to the committee at an early period, has convinced us that, surrounded with great difficulties as the subject appeared at the outset, the obstacles eventually met with in an effective experimental inquiry are of a far more formidable character than could have been anticipated. Having devoted five days exclusively to the practical study of one of those processes (Ransome's), and having been unable, in that period, to elaborate even this single process sufficiently to warrant us in expressing a definite opinion upon its merits, it is obvious that anything like an elaborate examination of the numerous proposals which have only just now been submitted to us would require the expenditure of a far greater amount of time than the committee could place at our disposal.

3. Whilst regretting that it is not in our power to lay before the committee a positive recommendation of any particular process, we beg to submit the following observations:—

An examination into the nature of the several processes proposed leads to their classification, under two heads:—

(*a*) Processes which are likely to afford permanent protection to the stone.

(*b*) Processes which are only calculated to afford protection of a temporary character.

In both of these classes there are proposals which may at once be excluded from further consideration, on account either of their inapplicability to stones when placed in a building, or of the obvious misapprehension, on the part of the proposers, of the problem to be solved.

A proposal to protect stones by immersion in a boiling mixture of pitch, or resin, and oil, may be quoted in illustration of the processes which are only applicable to stones previous to their having become integral parts of any structure; again, the suggestion to cover the building with a coating of a mixture of silica with sulphur, applied in a semifluid condition, would involve almost insurmountable difficulties in its practical application; not to speak of the inflammability of the sulphur, which is only slightly diminished by the presence of the silica; or the uncertainty of the temporary character of the protection which, under the most favourable circumstances, could be afforded by this material.

Several of the suggestions are based upon notions so obviously erroneous, such as coating the building with sulphate of lead, and procuring an alleged galvanic protection by establishing connections of this coating with plates of zinc; or, of ridding the building of the principle of decay by fermentation, that no object whatever could be gained by entering more fully into the merits of these proposals.

Of the processes which are intended to afford permanent protection to the stone, and the use of which is not precluded by the conditions of the case, there are several which claim a careful investigation. These processes may be classed under the following heads:—

1. Application of silicates of the alkalies, in various states of concentration.

2. Application of silicates, in conjunction with various saline compounds, intended to produce double decomposition.

3. Application of hydrofluoric or hydrofluosilicic acid, or their saline compounds.

4. Application of phosphoric acid, and acid phosphates.

5. Application of solutions of the alkaline earths, or their bicarbonates, in water.

All these processes are more or less based upon chemical considerations, which are supported by analogy, and which, in the case of the two first-named classes have received considerable experimental confirmation. The experiments which are now in progress with several of the processes included in the two first sub-divisions will, we believe, in the course of a few years, furnish ample

data for correct conclusions regarding their applicability. In the mean time it might be advisable to apply to portions of the New Houses of Parliament actually undergoing decay, certain processes selected as representatives of the remaining classes above enumerated, in order that their merits might be submitted to the only conclusive tests,—those of actual application, and protracted exposure to the corrosive influence of a London atmosphere.

The second division of processes, namely, those which are only calculated to afford protection of a temporary character, are, from their very nature, of minor importance for the purposes of the Committee's inquiry; nevertheless, as the claims to permanence of none of the processes of the first division have as yet been substantiated by the test of time, we would recommend that, in addition to the experiments already made in this direction, further trials be instituted of some of the more promising materials of this particular description. This recommendation is based upon the consideration that substances, included under the appellation of organic, differ essentially in their powers of resisting the destructive action of the atmosphere. Whoever is acquainted with the nature of organic substances, cannot fail to appreciate the different degrees of stability under atmospheric influence exhibited by gluten, gelatine, or starch (which we find enumerated among the proposed protective agents), and by bees-wax and paraffine, not to speak of many of the fossil gums, which exhibit a degree of permanence approaching that of mineral substances.

The materials which we would recommend for selection to be tried in comparison with linseed oil, are paraffine, bees-wax, and some of the more permanent gums and resins, applied in the form of solutions in volatile solvents.

We should not omit to remark, that some of the witnesses, and others, who have addressed the Committee, speak of secret processes. We cannot, of course, offer any opinion regarding such proposals; but we should doubt the applicability of any suggestion which would demand the veil of secresy for protection.

Finally, we beg to state, as the result of the experience which we have been enabled to acquire during the prosecution of our investigations on this subject, that a definite solution of the question at issue can only be arrived at after the lapse of a considerable period; since the relative merits of the processes which we recommend for trial can be established only by the test of time.

A. W. Hofmann.
E. Frankland.
F. A. Abel.

Report of Sub-Committee on Nature and Causes of Decay of Building Stones.

17 July, 1861.

Sir,—Having been requested to submit to the Committee our opinion on the nature and causes of the decay of building-stones generally, and of the stone employed in the construction of the New Houses of Parliament in particular, we now have the honour to submit the following observations:—

Building-stones in general may be divided into two classes,—

1. Those which consist of materials not easily acted upon by acids.

2. Those composed of materials which are, partially or entirely, acted upon by acids with facility.

As an illustration of the first class, granite, porphyries, and serpentines may be quoted; whilst to the second belong limestones, dolomites, and certain sandstones, containing carbonate of lime as cementing material.

The stone used in the New Houses of Parliament belongs to the second class of building materials; consisting, as it does, almost entirely, of the carbonates of lime and magnesia. The following analyses of several varieties of dolomite by Professor Daniell and Messrs. T. Ransome and B. Cooper, are quoted in illustration of the general composition of the stone in question:—*

	Bolsover Moor.		North Anston.		Woodhouse.	Steetley.
	Daniell.	Ransome & Cooper.	Ransome & Cooper.	Ransome & Cooper.	Ransome & Cooper.	Ransome & Cooper.
				Stone Ends.		
Carbonate of lime	51·1	52·07	51·89	55·37	52·80	53·95
Carbonate of magnesia	40·2	40·60	42·07	41·71	44·31	43·78
Sulphate of lime	.. ..	.. ..	.. ..	.. ..	.. ..	trace.
Protoxide of iron	.. ..	0·89	0·49	0·73	0·63	0·61
Oxide of iron and alumina	1·8	—	—	—	—	—
Peroxide of iron	.. ..	0·83	0·24	—	—	—
					Carbonate.	
Protoxide of manganese	.. ..	trace.	trace.	1·68	1·81	—
Silica	3·6	3·64	0·56	0·92	0·47	0·41
Water	3·3	0·48	0·51	0·45	0·23	0·12

	Roach Abbey.	Huddlestone.	Park Moor.	Lindley's Bolsover Quarry. Woodhouse, near Mansfield.
	Daniell.	Daniell.	Daniell.	Ransome & Cooper.
Carbonate of lime	57·5	54·19	55·7	54·65
Carbonate of magnesia	39·4	41·37	41·6	38·58
Protoxide of iron	.. .. ..	.. .. ..	.. .. ..	0·74
Peroxide of iron	.. .. ..	.. .. ..	.. .. ..	0·62
Oxide of iron and alumina	0·7	0·30	0·4	—
Carbonate of manganese	.. .. ..	.. .. ..	.. .. ..	2·43
Silica	0·8	2·53	0·0	1·30
Water	1·6	1·61	2·3	0·46

Regarded from a purely chemical point of view, the difference in the resisting power to corrosive agents of different stones would appear, at first sight, to depend entirely upon their chemical composition; but even a moderate acquaintance with the properties of the components of such building stones demonstrates that there are other conditions at least equally instrumental in determining the degree of permanence of different stones.

It is a well-established fact that *the same* chemical substance exhibits, in different conditions, a great variation in its behaviour with chemical agents. Numerous examples might be quoted in illustration of this. Thus, marble and chalk are chemically identical; but, owing to the difference in their physical structure, the one being crystalline and the other amorphous, the former is much less readily acted upon by acids than the latter. Again, artificial peroxide of iron is readily soluble in acids; peroxide of iron, in the form of hæmatite, is attacked with difficulty by acids; and the same oxide, after exposure to a powerful heat, is almost entirely insoluble in acids. The influence of aggregation in these instances, and in numerous others which might be quoted, is obvious and generally admitted by chemists, however different and imperfect may be their views regarding the connection between physical condition and chemical effect.

The observations just made regarding the behaviour of substances such as enter into the composition of building stones cannot but apply with equal force to the aggregates of such components to the building stones themselves.

The atmospheric influences to which building stones are subject are many of them essentially chemical actions, involving processes analogous to, or identical with, those performed in the laboratory; although, from the extreme dilution of the chemical agents, as existing in the atmosphere, they must necessarily be of a very gradual character.

There are few instances in which the influence of the state of aggregation upon the permanence of a building stone is more apparent than in that of the dolomitic limestone, used in the construction of the new Houses of Parliament. Here, in one and the same block of stone of comparatively small dimensions, we find certain portions of the surface powerfully disintegrated, while others appear in a perfectly sound condition. Chemical analysis has hitherto failed to establish any important difference in the composition of sound portions of such stones and those parts which are subject to decay: it is therefore legitimate to attribute the unequal permanence of the stone, under atmospheric influences, to such structural differences as may be comprehended under the term—state of aggregation.

Before proceeding to an examination of the particular character of the decay observed in the stones of the new Houses of Parliament, it may perhaps be desirable to glance at the nature of the changes to which building stones generally are subject under atmospheric influences. Under normal conditions these changes must be ascribed to the action of the oxygen, carbonic acid, nitric acid, and water, in the atmosphere. In the air of towns, however, there are certain other constituents, such as several acids of sulphur, and occasionally hydrochloric acid, which cannot fail to exert an additional disintegrating influence upon building stones.

The action of oxygen must be of comparatively a subordinate character; its effects being confined to constituents which occur but rarely, and generally in limited proportions, in building stones; such as the sulphides of iron, and the protoxides of iron and manganese; these compounds, being very prone to oxydation, would tend to disintegrate the stones by the absorption of oxygen. Of far greater importance are the effects of carbonic acid and water. Carbonic acid, in the presence of water, is a powerful solvent: it not only corrodes the calcareous and magnesian carbonates (more or less powerfully according to their state of aggregation), whether they form the principal constituents of the stone, or are only present as cementing materials; but is capable even of attacking and gradually decomposing the hardest and most indestructible rocks.

In the case of the calcareous and magnesian constituents of stones, carbonic acid acts by transforming the insoluble earthy carbonates into soluble bi-carbonates, which are thus removed from the substance of the stone; whilst its influence on silicious rocks consists in the elimination of the alkaline bases, in the form of carbonates, and the separation of the silica in a more or less friable condition. The weathering of granites, and their gradual transformation into the several varieties of porcelain clay, afford an interesting illustration of the latter kind of action. In the changes just mentioned, the carbonic acid and water are equally concerned; the water serving not only as a vehicle for the introduction of the carbonic acid into the pores of the stone, but also as a solvent for the products of its action. There are changes, however, to which building stones are subject, in which water is the sole agent, and which are more of a mechanical than of a chemical character. The expansion which water undergoes on freezing, and the irresistible force which it then exerts, are well known: it is obvious that water freezing within the pores of a stone must exercise a disintegrating action not less powerful than those above referred to.

Recent researches have demonstrated that nitric acid is a frequent and perhaps even a normal constituent of the atmosphere; and, as such, must undoubtedly assist in the destruction of magnesian and calcareous stones; but the proportions in which this acid has been found are so minute, that it need not be dwelt upon as an important destructive agent. This remark, however, does not apply to the acids referred to above, as existing in the atmosphere of towns. The quantity of sulphur-acids in the air of towns, where a considerable amount of coal is consumed, is quite appreciable. According to the determinations of Dr. Angus Smith, the air of Manchester contains an average proportion, corresponding to one part of sulphuric acid in every 100,000 parts of air, which, in the centre of the town, rises to twenty-five parts in 100,000. No numerical data exist with regard to the proportion of sulphur-acids in the London atmosphere; but it can scarcely be doubted that, in the neighbourhood of the new Houses of Parliament, they are present to an extent equal to the average amount found in the Manchester air: they must, therefore, be regarded as among the more important agents, destructive to stone, which are present in the London atmosphere.

A few observations remain to be offered regarding the particular nature of the decay manifesting itself in some of the stone of the new Houses of Parliament. It has already been pointed out that, so far as our experience goes, we are inclined to attribute the local character of the decay to struc-

* The analyses by Daniell are quoted from the "Report of the Inquiry undertaken under the Authority of the Lords Commissioners of her Majesty's Treasury, by C. Barry, esq., H. T. De la Beche, esq., W. Smith, esq., and Mr. Charles Smith, with reference to the selection of stones for building the New Houses of Parliament." Those by Ransome and Cooper are extracted from a paper on "The Composition of Limestones used for Building Purposes, especially on those employed in the Erection of the New Houses of Parliament," contained in vol. ii., part ii. (1848), of the Memoirs of the Museum of Practical Geology.

tural differences, obtaining in different parts of the stone. The general structure and the composition of the stone in the new Houses of Parliament render it, moreover, amenable to all the sources of disintegration which we have above enumerated, with the exception perhaps of oxygen, which can scarcely produce any appreciable alteration in dolomite. Thus, the chemical action of carbonic and sulphuric acids, in combination with water, will gradually dissolve and remove the carbonates of lime and magnesia, whilst the porous nature of the stone renders it liable to the mechanical effects of water under the influence of frost. The presence of sulphuric acid in the air of towns appears, in the case of magnesian limestone, to bring into play another process of destruction. This acid not only corrodes and renders soluble, as we have pointed out, the earthy carbonates (in which respect it resembles carbonic acid in its effects), but, forming with magnesia a readily crystallizable salt, the well-known sulphate of magnesia, remarkable for the large proportion of water of crystallization which it fixes; it gives rise, in addition, to a mechanical destruction of the stone precisely similar to that produced by freezing water. The powerful mechanical effects resulting from the solidification of water, induced by crystallization, are well known; although it would appear that they have not hitherto been sufficiently appreciated as auxiliaries in the process of disintegration of stone. The analogy between the solidification of water, by freezing and by crystallization, is perfectly obvious; and a French chemist has suggested, as a means of recognizing stones liable to disintegration by frost, to immerse them in a solution of sulphate of soda, and to note the subsequent effects of its crystallization within the stone.

We have ourselves recently had occasion to observe some phenomena which go far to elucidate these destructive effects of crystallization. The exfoliations exhibited by many of the fictile vases deposited in the British Museum were found to be due to the formation and crystallization, within the substance of the vessels, of nitrate of lime. Again, in experiments on the preservation of fabrics by impregnation with saline substances, it was found that the crystallization of sulphate of magnesia, within the material, produced a disintegrating effect upon the fibres, sufficient greatly to weaken the material.

In conclusion, we would remark, that the effect attributed to the crystallization of the sulphate of magnesia, in assisting the decay of dolomitic stones, and more particularly of those used in the construction of the new Houses of Parliament, is borne out by the existence of a marked efflorescence of sulphate of magnesia upon those portions of the stone where exfoliation has taken place.

A. W. Hofmann.
E. Frankland.
F. A. Abel.

We shall give other parts of the Return next week.

THE NATIONAL EXHIBITION IN FLORENCE.

A memorable day was the 15th September for Florence, — the joyous excitement shared by all classes, the richly varied decoration of streets, the display on every side of national colours and symbols, and the enthusiastic reception given by this people to their king, altogether combining in what seemed the highest expression of that new life to which liberated Italy has awakened; and at the same time asserting for her—the "Etrurian Athens,"—that brilliant position vindicated by her past and present; that title which, whatever be future contingencies, must continue to command regards and honours for her as, by indefeasible right, the intellectual if not the political capital of united Italy. As for the scene in the palace of the National Exhibition that morning, it was rather a court ceremonial than anything else, though, indeed, most beautiful to behold, and attended with demonstrations most fervent. The opening address by the Marquis Ridolfi, the reply of Victor Emmanuel, and the thrilling effect of the National Anthem, sung by Piccolomini, have been done justice to in all the papers: but subsequently have come the opportunities for appreciation, and estimating the real value of this, Italy's first national and general display of her produce from genius and industry. The exhibition remaining open six days of the week, the concourse has been, as expected, great, but not overwhelming, and the liberal system of gratuitous days (every Sunday), has completely answered. On the first day the visitors numbered 21,000, yet, though naturally, including the humblest classes, a throng that occasioned not the slightest disorder, affording, indeed, additional proof in favour of the opening of places for intellectual recreation on that festival, now carried out in regard to every art-gallery and museum in Florence,—all thus made accessible on the Sundays since the change of Government in 1859.

The practice of annual displays, to show the progress of commerce and industry, was adopted by Florence first among Italian cities, and from an early period in her brilliant Mediæval history. These *mostre*, as they were called, used to coincide with her great religious anniversary, the festival of St. John; and, indeed, became the special pageantry of that day, the piazza around S. Giovanni, the present baptistery, being then converted into a pavilion of azure draperies embroidered with the French lily, spread over every house-front; and along the principal streets were exhibited, at stalls, or by other arrangements outside the houses, the manufactures in woollen, silk, velvet, brocade, and the costlier wares of the goldsmith, in all which this city's produce was then supreme as to quality and quantity. These displays, says the historian Goro Dati, "would have sufficed to adorn ten kingdoms." Such was the festival of the Baptist in Florence of the olden time!

The story of Italian exhibitions, industrial and artistic, may be said to have its centre in the Tuscan examples. Under the boldly-innovating government of Peter Leopold was ordered the first public exhibition of fine arts this country had yet beheld, in 1791. French invaders next set the examples, to be followed with more systematic procedure in the present century; and under their auspices took place at Turin, 1805, '11, '12, the first series of general exhibitions for all local produce, artistic, industrial, agrarian. After the legitimate restorations, were founded in the same kingdom, under Charles Felix, triennial industrial exhibitions, the first of which took place in the beautiful suburban palace of Valentino, near Turin, in 1829, the number of exhibitors being 502; and with what success this system advanced in subsequent years appears from the steady increase of those numbers, till, in the last instance, at the Turin exhibition of '58, it reached the maximum of 1784, among whom 931 then received prizes.

Two extraordinary exhibitions at Genoa, within recent years, have borne proof of the progress and energies that have especially marked the Piedmontese above other Italian states,—one in 1844, to honour the meeting of the first *savans* in this country; the other, in 1854, to coincide with the opening of the railway between that city and Turin. In the papal states, Bologna, ever foremost, and in many respects bearing away the palm from Rome herself, first followed the example by instituting agrarian and industrial exhibitions in 1851; ordered to be thenceforth triennial in 1853; and it seems efficiently promoted by the Pontific Commissary, who had governed the four legations since 1849. The last Bolognese exhibition, in 1856, was such an improvement on all preceding, that the halls and corridors of the University (not a very extensive building) could scarcely contain the numbers attracted to that locality chosen for the display. Nor should it be forgotten that the Lorraine Government in Tuscany, whatever its defects otherwise, acted laudably in promoting public interests and improvements through similar means; for it was in Florence, 1839, that the first exhibition of arts and manufactures unitedly took place under Italian *régime*, ordered to be triennial, and first held in the Palazzo Vecchio, with no very great *éclat* indeed, seeing that the exhibitors were only 66; but, on the last occasion, before the fall of that dynasty, in 1854, their numbers had risen to 730, the prizes distributed to 148; and, from this last Florentine exhibition, it was judiciously ordered, should be selected all the products of native art and industry deemed worthy to compete on a much greater arena in Paris, 1855. Other exhibitions, exclusively industrial, were given here in 1851 and 1854, with eminent success.

The grander idea of the national Italian display to include every illustration of the art, industry, manufactured and natural produce of the whole peninsula, sprang from that more limited one, mooted soon after the change of government in Florence, of an exclusively Tuscan exhibition, universal in respect to these provinces alone; and the merit of the first project rests with Signor Sella, a young man, author of several useful writings, and professor of geometry at the Technical Institute in Turin, who brought forward this idea the first day he sat in Parliament as Deputy for the province of Biella, his native place, the 12th June, 1860; nor were authorities tardy in acting upon the happy suggestion, as, four days afterwards, the project was discussed, formalised into a bill drawn up in parliamentary phrase; and on the 8th of July following appeared the royal decree assigning 150,000 francs to the Ministry of Commerce and Public Works as subsidy for the National Exhibition, and appointing a committee, to hold its inaugural session in Florence on the 20th August. This body was brought to its full complement by appointments from different sources: by the Crown being named the president, Marquis Cosimo Ridolfi the vice-president, Professor Amici (Director of the Technical Institute), and the secretary-general, Signor Carega, Professor of Agriculture at the Florentine Institute: by the Ministry, seventeen members; and twenty-eight more by the several chambers of commerce at the principal cities, were united under one Italian Crown on the mainland and in Sicily. The works admissible were prospectively divided into twenty-four classes, the last three being the branches of fine art, among which architecture is represented by drawings; and it was decided that objects produced in Italy, whether by natives or foreigners, should be admitted alike with those by Italians resident in other countries, though under the restriction that works of fine art should have previously received approbation from academies or institutes empowered by the royal committee.

The Palace, which has sprung out of a railway station with marvellous rapidity, was brought to the completeness requisite for the inauguration within seventy days from its commencement, by the labours of more than 1,300 workmen, relieving each other day and night without intermission. Within about a fortnight before the 15th of September, were thrown up two wings, each 50 mètres long, to contain sculpture and agrarian machines or implements. One's evening walks to the Coscine were, at this period, rewarded, from time to time, by a spectacle of progressive construction that often amazed, suggesting the idea of the enchanter's wand. The station, raised in 1849 by Signor Presenti, of Cortona, still forms the nucleus to the vast edifice that leaves scarcely one external trace of that original structure we might suppose completely swept away; and, though a magnificent design for the new Palace was presented by Signor Barbetti, the one eventually chosen was that of Chev. Martelli, superintendent of the Royal Fabrics in Tuscany, but not before his composition had been subjected to many curtailments and brought within proscribed limits of time and cost, much to the detriment of its beauty.

The peristyle, projecting at the centre into a wide semicircle of Ionic columns, supporting a cupola, with a group of colossal statuary, Italy in the midst, on the frontispiece of the attic above (in Martelli's first design), would indeed have been more imposing and graceful than the rather too narrow and simple façade we now see erected, with a plain rectilinear colonnade, also Ionic, and a frieze above the architrave to illustrate the progress and glories of art, commerce, &c. Three wide gateways have been opened to admit into the Cascine from the Lung' Arno promenade, the central with colossal statues on the two great piers flanking the entrance. These gateways have at least the merits of solidity and simplicity; and, as we approach the new structure, with its many outworks, gain much in picturesqueness from the clustering foliage of noble trees and the background of mountains. In front, within the enclosed esplanades before this edifice, stands an equestrian statue of the king, painted to imitate bronze, rather theatrical, but entering well into the *ensemble*.

On the whole, the exterior of this palace gives but faint suggestion of the splendour and vastness that take by surprise in its interior. Looking from a balcony that runs along the upper story at one end, across the level gardens, with an octagonal conservatory in its centre, and the ephemeral structures of glass and wood forming its boundaries on every side, to that prospect beyond of fair cultured environs, hills studded with groves and villas, and majestic Apennines sweeping far as the eye can reach, the scene is truly fascinating. What extent of these structures remains yet to be finished and opened cannot be divined till one has perambulated the whole; indeed, so incomplete was the achievement on the day of inauguration, that those who then visited this Exhibition (supposing no return to it since), can have received little idea of what was intended; and the public report is, that at least 1,500 cases were that day still unopened. The number of exhi-

bitors has been stated at 6,000; and was certainly, as announced from credible quarters, beyond half that amount two months before the 15th September. A new periodical, with illustrations, *L'Esposizione Italiana del*, 1861, commenced its career on the 15th July, expressly dedicated to this subject, to all interests, and all species of information connected with the Exhibition: this, now appearing twice a week, forms a creditable and useful addition to the somewhat overloaded supply of journalism in Florence; the engravings, from remarkable artistic works exhibited, generally executed well enough to enhance the value of this appropriate publication. On the very day of the inaugurating ceremony, another less ambitious journal began its campaign, trusting for success to special notices on the same absorbing topic, very cheaply supplied; this being, so far as I can reckon, either the 22nd or 23rd periodical now active in Florence!

A far deeper interest than attaches to the objects severally, in all this collection of Italy's produce, is in the evidence of that union so long craved, and here, at last, pacifically attained, which renders the vast aggregate so truly the trophy of a national cause, aptly symbolized by the armorial shields of all the Italian cities, with names in large letters painted on the compartments of that field of glass which over-roofs the great central body, divided by an arcade into two equal naves. And Venice, we rejoice to see, no less than Rome, has surmounted restrictions and jealousies by contributing in honourable abundance; many articles from the provinces still under Austria being enabled to arrive hither only by making a circuit through France,—some even by way of Constantinople.

The sculptures, which fill twelve rooms (besides two of casts), seemed to me altogether, *for Italy*, a disappointing collection: the preference for trivial subjects is carried to wearisome extent; and one looks with indifference on such an array of Bacchante and dancing girls, nymphs and shepherds, without individuality. Among the works by Florentine sculptors, most noticeable, are the fine colossal figures of Boudini, by Fantocchietti, and Burlamacchi, by Cambi; an affecting monument to an English lady (Mrs. Spence), by the first of these artists; a Madonna of the Immaculate Conception, by Santorelli. By Bartolini (deceased) is a group of Charity, by no means among the finest by that artist, whose Tuscan reputation claimed for him higher place than any other competitor of his time; and Powers, the American, exhibits a female figure, the *United States*, one of his best, stamped by a heroic character. Conradin on the Scaffold throwing down his Glove (a subject rather for painting) is a statuette of much spirit and feeling, by Costantino, a Milanese. From Rome, as might be expected, come the works that eclipse the greater part of those surrounding them, especially the Eve at the Moment of Temptation, by Benzoni, which stands pre-eminent for majestic grace and deep pathetic truthfulness. Fabris sends a pleasing group of Psyche gazing on the sleeping Cupid; Gajassi, a romantic Mediæval warrior, who might represent St. George; and Fabj Altini (a young artist), Beatrice in her ecstasy, as described in the "Paradiso," lovely, and all kindling with rapt emotion. Elsewhere one notices a magnificent specimen of wood carving, the portal for a Russian chapel, built by Prince Demidoff, near Florence, an elaborate work of Barbetti, divided into numerous compartments, containing reliefs to illustrate the entire Old Testament story, from the creation of man to the captivity in Babylon, reminding naturally of Ghiberti's immortal performance. Near this is a beautful reduction in a marble model of Della Quercia's fountain, with its many sacred and allegoric reliefs, on the piazza of Siena,—indeed, a restoration, for the original is wofully impaired,—by Giusti, of that city, executed for Lord Northesk.

The gallery of paintings, two very long suites, on the whole, impresses more favourably than that of sculptures. Few foreigners are aware how high the present attainment of the schools in the extreme north and south of Italy, Milanese and Neapolitan, is in the walks of landscape, historic, and *genre* figure pieces. Pagliano of Milan, Altamura, Mancinelli, and Celentino, of Naples, here exhibit groups that no one could pass by without lingering, more or less fascinated by each; but these are all surpassed by Morelli (also Neapolitan), whose powers of composition and colouring, quiet truthfulness, and rich but subdued effects that give life, free from exaggeration, to his groupings, struck me as the finest (their class cabinet-sized romantic pieces—the Byzantine Iconoclasts in the church where an artist monk is painting, who beholds their devastations with horror; a Venetian Serenade; a scene in the Pompeian Thermæ, &c.). Landscapes of considerable beauty, evincing study of nature, are contributed by Vertunni (of Naples), Induno (of Milan), and Camino (of Turin); and especially the Alpine scenes by the last impress by their calm grandeur, by the rendering of nature's most solemn effects from a poetic genius, superior to the conventional, and without the least touch of mannerism. One should notice, for the honour of the Tuscan school, the power of colouring, that reminds, in its best examples, of Titian, in the works by Puccinelli—Leo X. and his courtiers, at the Medici Villa of Careggi (near Florence), and Lucrezia Borgia mixing poison in a wine-goblet, a single figure, life-size, dress black velvet, terribly beautiful; also the grand composition, of numerous figures, by Bizznoli (lately deceased); Charles VIII. entering Florence with his army. A unique and very interesting series of small distemper pictures, altogether 150, by Bussoli, illustrates the entire story of the late Italian campaigns down to the siege of Capua, both grouping and landscape, the effects of nature, and the dread realities of battle, rendered with great ability; indeed, more to be prized when we know that this indefatigable artist (who executed the whole series for the Prince di Carignano) accompanied the Piedmontese army throughout, so as to sketch the sites, and so far as possible the very actions of the eventful drama he has thus admirably depicted, from reality. The "hall of gems," including cameos, mosaics, *pietra dura*, scagliola, gold and silver wrought objects, &c., offers a rich treat of marvels in material and workmanship, Rome here fully sustaining her character as *the* city of cameo and mosaic art; and among her contributions is a single cameo (two classic heads, one in relief beyond the other), by Girometti, valued at 30,000 francs, set as a brooch, but far too large for wearing, and not, I thought, so exquisitely beautiful as others; for instance, a Hercules head by the same artist. In this room, one most conspicuous among other treasures, is a tabernacle for a high altar, with a deep niche for the exposition of the Sacrament, in chiselled silver, by the brothers Mariotti, the design Italian Gothic of the fifteenth century, the ornamental details in low relief, of graceful character and most delicate finish. One becomes tired of likenesses of the King and Cavour; not so of the fine, frank aspect of Garibaldi, here seen (as to be expected) in all possible modes and sizes; and the continual recurrence of the patriotic tricolour, in draperies and banners profusely disposed over every part, forms an accessory, rich and appropriate, to the vast *ensemble*.

After five years, Florence is to have another national exhibition; fraught, it is to be hoped, with yet ampler and more nobly distinguished produce from all works of genius and industry; in eloquent proof how all things flourish amid the healthful atmosphere of liberty.

THE ART-UNION OF LONDON AND THE GOVERNMENT SCHOOLS OF ART.

A committee appointed to examine the works submitted in competition for the premiums offered by the Art-Union of London have made the following report to the council:—

"Your committee have had in view the original purpose for which the Art-Union was established; viz., to promote the knowledge and love of the fine arts, and their general advancement in the British empire, by a wide diffusion of the works of native artists; and to elevate art and encourage its professors, by creating an increased demand for their works, and an improved taste on the part of the public.

The committee have called to mind the various efforts which the council have made during a period of twenty-five years to fulfil its mission. In various departments of the fine arts their aim has been to create a love and taste for their study and productions; uninfluenced by any personal motive, whether of rivalry, reputation, or profit. The attention of the council has long been directed to one branch of their duties as specially worthy of consideration; namely, the application of the principles of high art to objects of common use or ornament in which all classes may take pleasure. The collections in the British Museum, not to speak of those of Naples, Rome, Paris, and Germany, show how intimately high art may be allied with the commonest purposes of life; and how intention, thought, and grace may be embodied, so as to cause general pleasure and produce refinement.

There is no reason why our manufactures may not arrive at the same excellence in an artistic point of view as is shown in older works. Is not the whole sphere of nature as open to us as to the ancients; demanding to be studied with equally high aspirations and with clear comprehensions? Is our national history to be read in vain? Are our poets, our traditions, to be overlooked? Why should not these be brought into play, and made to keep alive in our minds an admiration and reverence for excellence and beauty, by being transferred to the art-productions of our manufactories. This, however, is not to be effected by puny efforts, but by high aims and by constant laborious study; by a careful avoidance of meretricious ornament, and a disregard of the praise of the ignorant, whose conceptions of excellence do not go beyond the most common-place and inferior representations of nature and art.

The superiority of the French in many branches has made itself felt, not only in composition, form, and execution, but in lowness of price; and thus their productions have been of great material benefit to them, even in a commercial point of view. It has long been the desire of the Art-Union to contribute to the formation in this country of a class of art-manufactures of the highest character. With all the mechanical contrivances so abundant in Great Britain, the feeling for the beautiful ought to keep pace with the progress of science. But although much has been done during late years, yet very much is still wanting to enable us to equal the works of the past schools of Italy, and the past and present schools of our neighbours. There is still a wide field open, as witness the vast difference in the various types of Italian, French, and German taste.

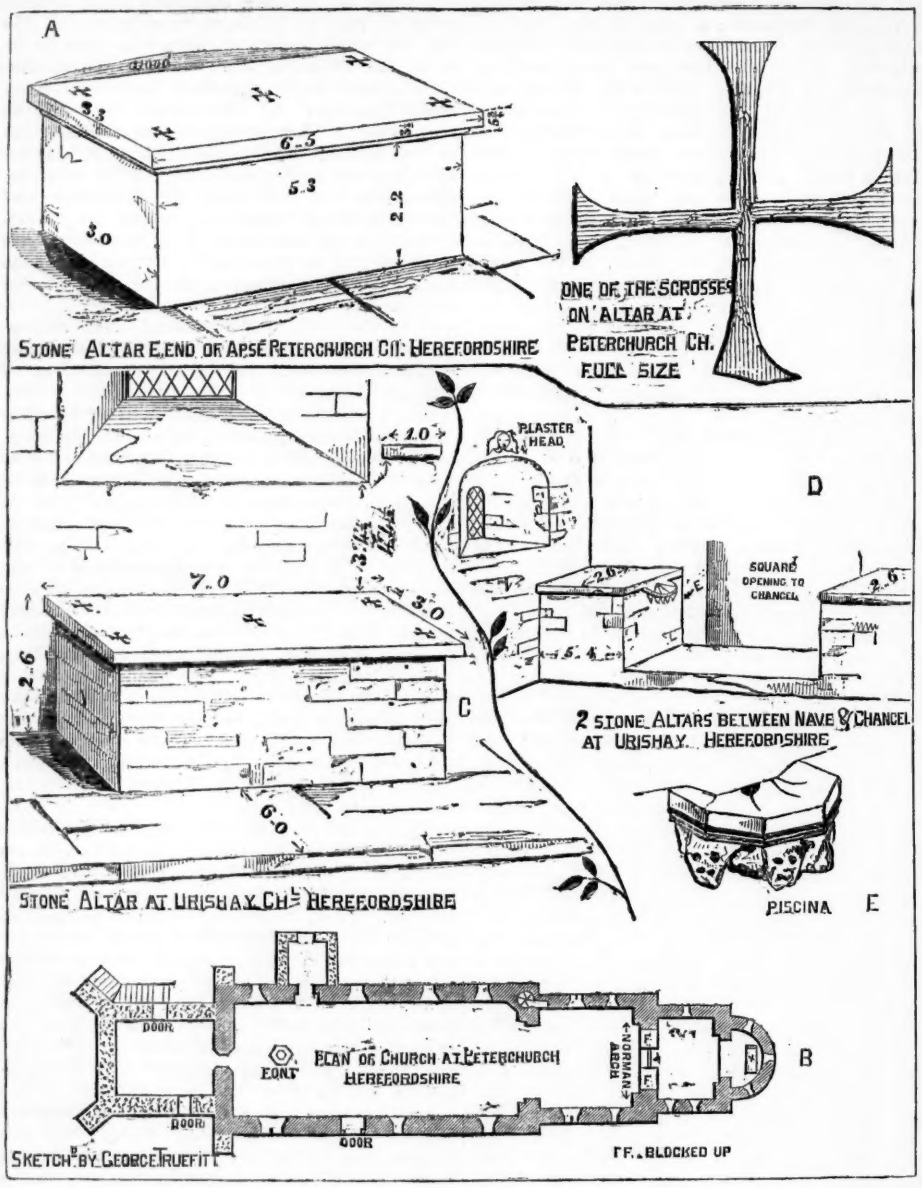
The council could not but recognize the efforts for good made by the Government in its elementary schools of art, and have sought to second, and carry still further, what has been already effected. They, therefore, issued a prospectus, offering premiums for drawings and models by the students. They had hoped thus to stimulate the students to higher aims; not by the money-value of the premiums, but by the more than local fame which would attach itself to the rewards of the Art-Union of London. It is with deep regret and disappointment that the committee report that the expectations of the council have not been realized; that in too many instances the efforts have been feeble; that the schools have not shown any daring anxiety to ensure the nobility of success in the eyes of the British public, and to stamp their respective establishments with the distinction of pre-eminence in this general contest.

The Art-Union of London would not appear to shrink from the responsibility they have assumed, but desire to show their sincerity by awarding premiums, on the present occasion, for efforts, which they trust will at future periods be far excelled, and thus justify the experiment to excite emulation in those occupied in the art-productions connected with manufactures. They hope that those who have withheld now will hereafter offer their works in competition.

The council, in its programme, stated "that they considered it desirable to promote specially the study of the human and animal forms; containing as they do, so much of interest, variety, and beauty; and the full acquaintance with which once attained, seconded by freedom and mastery of handling, will give the student larger powers of conception, and greater facility of treatment than was previously possessed—qualities essential for raising ornamental art to a high state of perfection. Your committee regret to perceive, that the human or animal figures introduced in these designs are negligently treated. They are disappointed (except in the case of one drawing) at the want of knowledge of anatomy shown in drawings from the model, and at the absence of a just appreciation of form and proportion in the designs for vases, &c. A model of a tazza, and a drawing from the life, from the School of Kensington, show promise, but do not possess sufficient merit for a premium.

It is with much satisfaction that the Committee recognize in one of the designs for a majolica dish, a boldness of conception, a freedom of handling, and knowledge of the treatment necessary for the special object, which are extremely satisfactory. They therefore recommend to the Council to award to the author one of the highest premiums,—10*l*.; and beg to suggest that he should be communicated with on the subject of completing his design, and producing a dish to serve as a prize in the next distribution.

The following are the premiums which the



STONE ALTARS.

Committee recommend to the Council to award,—viz.: 10*l.* to Mr. M. R. Elden, of the Stoke School of Art, for a majolica dish, just now referred to; 5*l.* each to Mr. A. T. Elwes, of the School of Art, South Kensington; and to Miss C. Phillott, of the Female School of Art, Queen-square, for drawings of animals from life; and 5*l.* to Mr. Frederick Gentes, of the Birmingham School of Art, for a design for a majolica dish."

STONE ALTARS.

Mr. Humbert, writing to the *Builder* about the altar-stone just discovered at St. Cross, Winchester (p. 647), suggests that it will be advisable to get a list of the "altar slabs" at present remaining in our churches. Stone altars complete, however, will be more interesting still; so, having just seen four of them in one parish in Herefordshire, I send you sketches of the same for insertion in the *Builder*, if you think it worth your while to engrave them.

A is the one as it now exists in the church at Peterchurch, about a dozen miles from Hereford. It is at the east end of the apse, as shown in the plan B of this curious Norman church; for, with the exception of tower, spire, and porch, the whole building is of that period.

C is another stone altar, which is at the east end of a desecrated Norman chapel adjoining Urishay Castle, in the same parish.

A carpenter, I found, had taken possession of the chancel, making use of the altar, of course, as may be supposed. The nave appeared to be the place for making up mortar, stowing away rubbish, &c., &c. A thick wall, with square modern opening, separated nave and chancel; and on the western side of this wall, and on each side of entrance to chancel, appeared to be a stone altar with a Norman piscina, as shown in sketch D. These two altars, if they are such as I believe them to be, were in such a state that no traces on either could be found of the five crosses, which, however, were perfect on the high altar C, and also on the one, A, at the parish church. Mr. Armitage, the hospitable rector (one of the old school) at Peterchurch, informed me of the chapel at Urishay, in his parish, or I should probably never have heard of this out-of-the-way little building. The castle, an old house, has been very interesting: the staircase is very good; so are some of the rooms, which have been admirably fitted up by Mr. Blackiston, a gentleman now residing there. It is to be hoped that the pages of the *Builder* will be made use of to follow up this subject of stone altars; and that before long we shall have descriptions and engravings of all that remain in this country.

George Truefitt.

PROPOSED LONDON CONGRESSES IN 1862.

It appears that the fourth session of the International Philanthropic Congress is to be held in London next year, on the occasion of the Great Exhibition. Among those who have expressed their concurrence are, Lord Brougham and the Council of the National Association for the Promotion of Social Science, the Earl of Shaftesbury, the Earl Ducie, the Earl Fortescue, Lord Ebury, Lord Raynham, the Right Hon. W. Cowper, M.P., Sir Thomas Phillips, and other well-known men.

A circular, in the French language, signed by Mr. T. Twining, jun., and which has been extensively circulated abroad, gives the subjoined list, as suggesting some of the desiderata with respect to which co-operation would be most valuable:—

"*Architecture.*—Models, plans, and working drawings of buildings conformable to the principles of hygiene, and intended for the use or benefit of the working classes; *e.g.*, *cités ouvrières*, model dwellings for town and country, hospitals and asylums, infant nurseries, baths and wash-houses, working men's coffee-houses, public slaughter-houses, depositories for the dead.

Building Materials.—Cheapness, durability, impermeability, &c.

Cottage Furniture.—A sanitary committee, appointed by her Majesty's Commissioners for the International Exhibition of 1862, proposes to organize a series of experiments on the relative value of appliances for warming, lighting, &c. Manufacturers are also invited to undertake careful experiments,* and to transmit the results to F. R. Sandford, Esq., the secretary of the International Exhibition of 1862.

Clothing.—Fabrics and articles of clothing deserving of attention in a hygienic point of view; costumes for children and adults adopted by charitable institutions or public establishments, or customary in certain industrial occupations; national costumes.

Food.—New resources; preservation; purification; analysis with respect to the nutritive properties, detection of fraud, &c. (For details, see the memorandum entitled "Museums for the Working Classes," to be had at the Society of Arts.)

Public Safety.—Hygiene.—Protection against inundations, &c.; drainage; sewerage, water-supply; ventilation; prevention of damp, smoke, &c.; cheap hygienic and medical appliances; means of relief for infirmities of every kind, and of occupation for the infirm; improved ambulances; protection against beasts of prey, vermin, &c.; means of relief for cases of poisoning, asphyxia, &c.; means of safety against shipwreck, fire, railway accidents, &c.; protection against excessive heat and cold; means for the prevention or relief of the injuries and diseases to which the working classes are liable in the exercise of their occupations (see the memorandum mentioned above); contrivances for lightening labour, for facilitating conveyance of burthens, &c.

Popular Education.—This important department could not be overlooked in an exhibition organized by the Society of Arts, whose influence has of late years been so successfully directed to the education of the industrial classes. A committee, which includes men of eminence in this department, has drawn up a detailed list of educational appliances, which may be obtained on application, either to F. R. Sandford, esq., Office of the International Exhibition of 1862, No. 454, Strand, London; or to P. Le Neve Foster, esq., Society of Arts, Adelphi, London. The friends of popular improvement will doubtless be glad to co-operate, by promoting the exhibition of everything which their respective countries can supply, best calculated for the education of the poor, and for the easy and agreeable development of the mind, with a view to the practical purposes of life."

We understand, also, that the Congress of the Social Science Association will be held in London next year, and that H. R. H. the Prince Consort will be asked to preside. Various other arrangements are in progress, which will tend to increase the interest and excitement that will necessarily attach to 1862. We trust that the Royal Academy and other art bodies will not be behindhand, and will organize arrangements for the reception and entertainment of the distinguished foreign artists who may be led to visit the metropolis on the occasion of the approaching Exhibition.

MONUMENT IN WOKING CEMETERY.

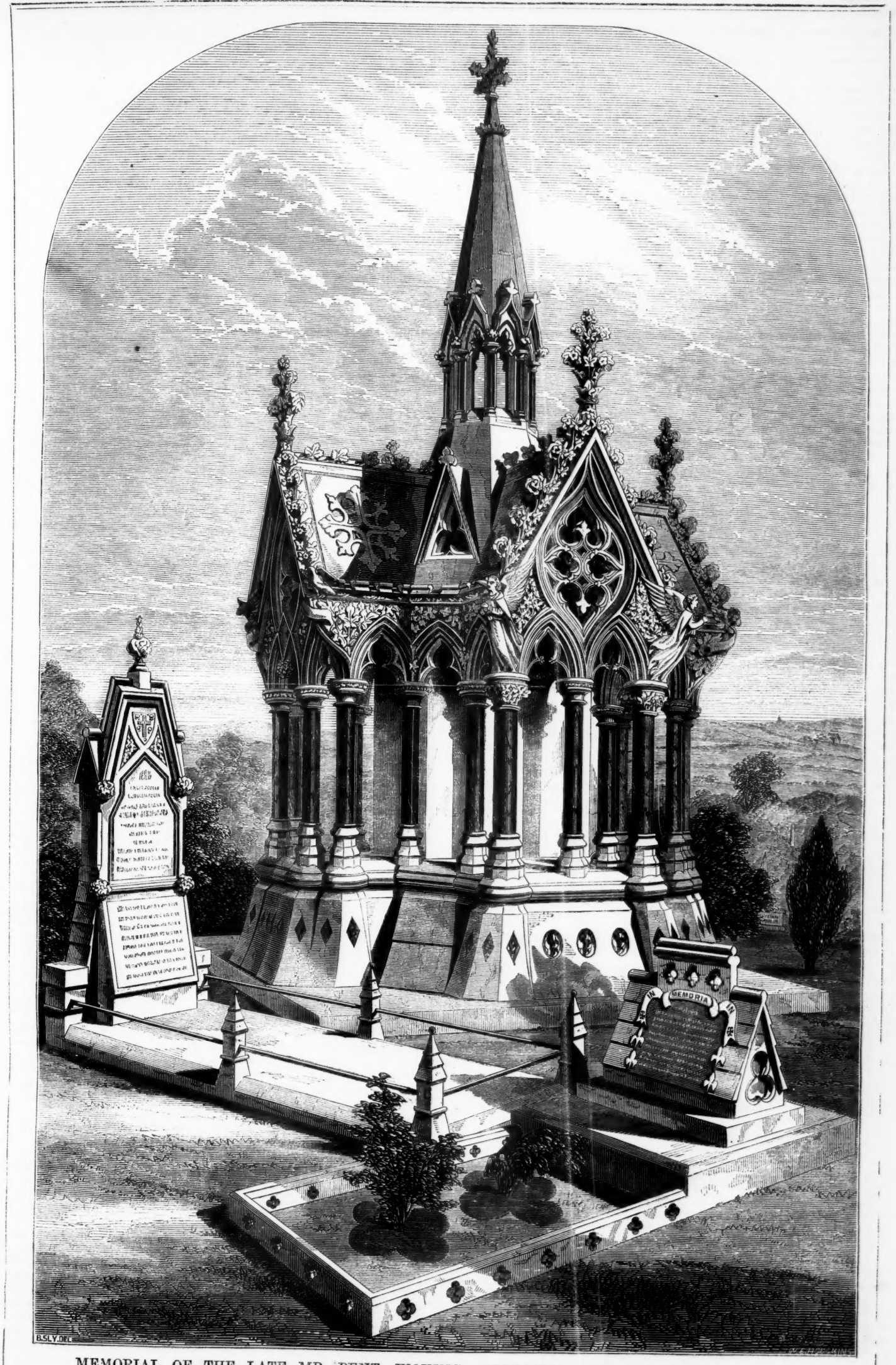
DESIGNS FOR TOMBSTONES.

The principal subject in the accompanying engraving is a monument that has been erected in the London Necropolis, Woking, in memory of the late Mr. Bent, from a design by Mr. Alfred Smith, architect, of Buckingham-street, Strand. The material is Bath stone, with Derbyshire spar for the shafts of the columns, and the cost was about 250*l.* Mr. Osborn Place was the contractor.

The cemetery, it will be remembered, is on the South-Western Railway, and consists of 1,200 acres, 400 of which have been enclosed, and separately apportioned to the Church of England, Dissenters, Roman Catholics, and other religious bodies.

We have engraved in the foreground two designs for tombstones of much less importance sent to us by Mr. S. Dutton Walker, architect, of Nottingham. Mr. Walker says,—"It has occurred to me that the lettering when coloured should be coated over with soluble silicate of soda or liquid glass: if this could be done, it would at once preserve the inscription, and render it more legible. But this is merely a suggestion, which I throw out for experiment."

* Indications of the mode in which it is desirable that these experiments should be performed will be supplied by the committee.



MEMORIAL OF THE LATE MR. BENT, WOKING CEMETERY.—Mr. Alfred Smith, Architect.
AND TWO DESIGNS FOR TOMBSTONES, BY MR. S. DUTTON WALKER.

SOME GLEANINGS FROM LORD BACON'S ESSAYS ON OLD LONDON GARDENING AND ARCHITECTURE.

Great as is the reputation of Lord Bacon, both as a philosophical and as an eloquent writer, with a large portion of general readers, his works are but little read. It may therefore not be without interest or use if we gather a few extracts in connection with matters which come within our province.

His notes connected with gardening have a particular interest, inasmuch as they show the productions of the gardens of the Londoners in the reign of Queen Elizabeth and of James I.

Bacon was born on the 22nd of January, 1561, in York House, Strand, and baptized in the old church of St. Martin's-in-the-Fields, which stood not far off: his career is so generally known that it is not necessary to enter now into particulars: it will however, be worth while to glance at the "Prefatory Epistles" to the "Essays." The first is dated "From my chambers at Gray's Inn, this 30th of January, 1597" (Bacon would then be about thirty-six years of age), and is an address to "Mr. Anthony Bacon, his dear brother:—

"Loving and beloved Brother,—I do now like some that have an orchard ill-neighboured, that gather their fruit before it is ripe, to prevent stealing. These fragments of my conceits were going to print: to labour the stay of them had been troublesome, and subject to interpretation: to let them pass had been to adventure the wrong they might receive by untrue copies, or by some garnishment which it might please any that should set them forth to bestow upon them: therefore I hold it best discretion to publish them myself . ."

Another epistle is addressed "To my loving brother Sir John Constable, knight." This is dated 1612; but the place is not mentioned. In this address we find Francis Bacon stating that "My last essays I dedicated to my dear brother Mr. Anthony Bacon, who is with God. Looking among my papers this vacation, I found others of the same nature, which if I myself shall not suffer to be lost, it seemeth the world will not, by the often printing of the former. Missing my brother, I found you next; in respect of bond, both of near alliance and of straight friendship and society, and particularly of communication in studies; wherein I must acknowledge myself beholden to you; for as my business found rest in my contemplations, so my contemplations ever found rest in your loving conference and judgement. So wishing you all good, I remain, your loving brother and friend, Fra. Bacon."

The next introduction to the Essays is addressed to the Duke of Buckingham, and is subscribed "Fr. St. Alban." In this Lord Bacon says that his Essays have been more current than any of his works, "for that, as it seems, they come home to men's business and bosoms. I have enlarged them both in number and weight, so that they are indeed a new work. I thought it, therefore, agreeable to my affection and obligation to your grace to prefix your name before them, both in English and in Latin; for I do conceive that the Latin volume of them, being in the universal language, may last as long as books last. My instauration I dedicated to the king, and my History of Henry VII., which I have now translated into Latin, and my portions of Natural History, to the prince; and these I dedicate to your grace, being of the best fruits, that, by the good increase which God gives to my pen and labours, I could yield . . . . "

At about the time when the first of these prefaces was written a large portion of the great blocks of houses in Gray's-inn were built, and that which was partly occupied by Bacon still remains. It would, however, be vain (unless they have been very recently better informed) to inquire of any of the porters or other functionaries of this ancient inn for information. The curious in these matters will be told that they do not know the name in that neighbourhood; nevertheless, it was here that the future Baron of Verulam, Viscount of St. Alban, and, in the reign of James I., Lord High Chancellor of England, delighted in the garden and in the grounds, which had been in part newly laid out and much improved, in all probability by Bacon's suggestions. Some of the trees which still remain may have been planted by the hands of the philosopher. There is a view, of the date of the reign of Charles II., in the British Museum, which shows that the prospect from the grounds to the north must have been very beautiful. There was then nothing to impede the view, which was bounded by the heights of Hampstead and Highgate.

In the reign of Queen Elizabeth, and for some time afterwards, large gardens surrounded York House, and most of the residences of the nobility which stood along the Strand; and some idea of the luxuriance and beauty of these may be learnt from the following account, which it will be observed was "*particulars for the climate of London.*" Bacon says, "God Almighty first planted a garden; and, indeed, it is the purest of human pleasures. It is the greatest refreshment to the spirits of man, without which buildings and palaces are but gross handyworks; and a man shall ever see that when ages grow to civility and elegancy, men come to build stately sooner than to garden finely, as if gardening were the greater perfection. I do hold it, in the royal ordering of gardens, there ought to be gardens for all the months of the year, in which, severally, things of beauty may be then in season. For December and January, and the latter part of November, you must take such things as are green all winter: holly, ivy, bays, juniper, cypress-trees, yew, pines, fir-trees, rosemary, lavender; periwinkle, the white, the purple, and the blue; germander, flag, orange-trees, lemon-trees, and myrtles if they be stoved, and sweet marjoram, warm set. There followeth, for the latter part of January and February, the mezereon-tree, which then blossoms; crocus vernus, both the yellow and the grey; primroses, anemones, the early tulip, hyacinthus orientalis, chamaïris, fritellaria. For March there come violets, especially the single blue, which are the earliest; the early daffodil, the daisy, the almond-tree in blossom, the peach-tree in blossom, the cornelian-tree in blossom, sweet brier. In April follow the double white violet, the wall-flower, the stock gilliflower, the cowslip, flower-de-luces, and lilies of all natures; rosemary flowers, the tulip, the double peony, the pale daffodil, the French honeysuckle, the cherry-tree in blossom, the damascene and plum trees in blossom, the white thorn in leaf, the lilac-tree. In May and June come pinks of all sorts, especially the blush pink; roses of all kinds except the musk, which comes later; honeysuckles, strawberries, bugloss, columbine, the French marygold, flos Africanus, cherry-tree in fruit, ribes, figs* in fruit, rasps, vine flowers, lavender in flowers, the sweet satyrian, with the white flower; herba muscaria, lilium convallium, the apple-tree in blossom. In July come gilliflowers of all varieties, musk roses, the lime-tree in blossom, early pears and plums in fruit, gennitings, codlins. In August come plums of all sorts in fruit, pears, apricots, berberries, filberts, musk-melons, monks-hoods of all colours. In September come grapes, apples, poppies of all colours, peaches, melocotones, nectarines, cornelians, wardens, quinces. In October and the beginning of November, come services, medlars, bullaces, roses, cut or removed to come late; hollyoaks, and such like. These particulars are for the climate of London; but my meaning is perceived, that you may have 'ver perpetuum,' as the place affords."

After noticing, that "because the breath of flowers is far sweeter in the air (when it comes and goes like the warbling of music) than in the hand," the essayist remarks, that it is important to know those which do best to perfume the air; he therefore mentions some of the flowers and plants which have the sweetest smells. He then gives his ideas of a prince-like garden, which "ought not well to be under thirty acres of ground, and to be divided into three parts; a green in the entrance, a heath or desert in the going forth, and the main garden in the midst, besides alleys on both sides; and I like well that four acres of ground be assigned to the green, six to the heath, four and four to either side, and twelve to the main garden.

The green hath two pleasures. The one, because there is nothing more pleasant to the eye than green grass, kept finely shorn; the other, because it will give you a fair alley in the midst, by which you may go in front upon a stately hedge, which is to enclose the garden; but because the alley will be long, and, in great heat of the year or day, you ought not to buy the shade in the garden by going in the sun through the green. Therefore, you are, on either side of the green, to plant a covert alley, upon carpenter's work about 12 feet in height, by which you may go in shade into the garden." The author considers the use of different coloured earths as but toys, and we are informed that "The garden is best to be a square encompassed on all the four sides with a stately arched hedge; the arches to be upon pillars of carpenter's work of some 10 feet high and 6 feet broad, and the spaces between of the same dimensions with the breadth of the arch. Over the arches let there be an entire hedge, of some 4 feet high, framed also upon carpenter's work; and upon the upper hedge, over every arch, a little turnet, with a belly enough to receive a cage of birds; and over every space between the arches some other little figure; with broad plates of round coloured glass, gilt, for the sun to play upon: but this hedge I intend to be raised upon a bank, not steep, but gently slope, of some 6 feet, set all with flowers. Also, I understand that this square of the garden should not be the whole breadth of the ground, but to leave on either side ground enough for diversity of side alleys," &c. The ground within the great hedge is to be laid out in a varied design; but whatsoever form it is first cast in, it must not be too heavy or full of work, "wherein I, for my part, do not like images cut out in juniper or other garden stuff: they be for children. Little low hedges, round like welts, with some pretty pyramids, I like well." After referring to geometrical forms without any bulwarks or embossments, and a mount to be 30 feet high, and some fine banqueting-house, with chimneys neatly cast, and without too much glass, we are told that fountains have a great and refreshing beauty, but pools mar all, and make the garden unwholesome and full of flies and frogs. "Fountains I intend to be of two natures,—the one that sprinkleth or spouteth water, the other a fair receipt of water of some thirty or forty feet square, but without fish, slime, or mud. For the first the ornaments of images, gilt or of marble, which are in use, do well: but the main matter is so to convey the water, as it never stay either in the bowls or in the cistern; that the water be never by rest discoloured, green or red, or the like, or gather any mossiness or putrefaction. Besides that, it is to be cleansed every day by the hand; also some steps up to it, and some fine pavement about it, do well. As for the other kind of fountain, which we may call a bathing pool, it may admit much curiosity and beauty, wherewith we will not trouble ourselves;—as that the bottom be finely paved, and with images; the sides likewise; and withal embellished with coloured glass, and such things of lustre, encompassed also with fine rails of low statues; but the main point is the same which we mentioned in the former kind of fountain, which is that the water be in perpetual motion, fed by a water higher than the pool, and delivered into it by fair spouts, and then discharged away underground by some equality of bores, that it stay little; and for fine devices of arching water without spilling, and making it rise in several forms (of feathers, drinking-glasses, canopies, and the like), they be pretty things to look on, but nothing to health and sweetness."

For the heath, or third part of the plot, it is desirable that this be framed as much as possible to be a natural wilderness. It is, says our author, desirable to have trees in it, but some thickets made only of sweetbrier and honeysuckle, and some wild vine amongst; and the ground set with violets, strawberries, and other plants suitable for such a situation. The side grounds should be full of alleys, to give a full shade—some of them wheresoever the sun may be: some should be so framed that they may afford shelter from the sharp wind, and in some of those alleys there might be planted fruit trees, and set with flowers, "but thin and sparingly, lest they deceive the trees." There might also be some mounts, of a height leaving the wall of the enclosure breast high, to look abroad into the fields.

For aviaries Bacon does not care, except they be of that largeness which may be turfed, and have living plants and bushes set in them, that the birds may have more scope and natural nestling, and that no foulness appear on the floors of the aviaries; and "so," says the essayist, "I have made a platform of a princely garden, partly by precept, partly by drawing; not a model, but some general lines of it; and in this I have spared for no cost; but it is nothing for great princes, that, for the most part, taking advice with workmen, with no less cost set their things together; and sometimes add statues and such things for state and magnificence, but nothing to the true pleasure of a garden."

Thus discourses Francis Bacon on this subject. Let us now see how he writes respecting the erection of dwellings.

"Houses," says this authority, "are built to live in, and not to look on: therefore let use be preferred before uniformity, except where both may be had. Leave the goodly fabrics of houses for beauty only to the enchanted palaces of the poets, who build them with small cost. He that builds a fair house upon an ill seat, committeth himself to prison: neither do I reckon it an ill seat

* There are still fig-trees in Gray's and Lincoln's Inn, and the tradition of such trees is preserved in Fig-tree-court, in the Temple.

only where the air is unwholesome; but likewise where the air is unequal; as you shall see many fine seats set upon a knap of ground, environed with higher hills round about it, whereby the heat of the sun is pent in, and the wind gathereth as in troughs; so as you shall have, and that suddenly, as great diversity of heat and cold as if you dwelt in several places. Neither is it ill air only that maketh an ill seat, but ill ways, ill markets, and, if you will consult with Momus, ill neighbours. I speak not of many more: want of water, want of wood, shade and shelter, want of fruitfulness, and mixture of grounds of several natures; want of prospect, want of level grounds, want of places at some near distance for sports of hunting, hawking, and races; too near the sea, too remote; having the commodity of navigable rivers, or the discommodity of their overflowing; too far off from great cities, which may hinder business, or too near them, which lurcheth all provisions, and maketh everything dear; where a man hath a great living laid together, and where he is scanted; all which, as it is impossible perhaps to find together, so it is good to know them, and think of them, that a man may take as many as he can; and, if he have several dwellings, that he sort them so that what he wanteth in the one he may find in the other. Lucullus answered Pompey well, who, when he saw his stately galleries, and rooms so large and lightsome in one of his houses, said, 'Surely, an excellent place for summer; but how do you in winter?' Lucullus answered, 'Why do you not think me as wise as some fowls are, that ever change their abode towards the winter?'"

After remarking that although such huge buildings, the Vatican and Escurial, and some others, scarce contain a fair room in them;—the famous Lord Chancellor continues:—

"First, therefore, I say, you cannot have a perfect palace, except you have two several sides,—a side for the banquet, as is spoken of in the book of Esther, and a side for the household; the one for feasts and triumphs, and the other for dwelling. I understand both these sides to be not only returns, but parts of the front; and to be uniform without, though severally partitioned within; and to be on both sides of a great and stately tower in the midst of the front, that, as it were, joineth them together on either hand. I would have on the side of the banquet in front, one only goodly room above stairs, of some forty feet high; and under it a room for a dressing or preparing place at times of triumphs. On the other side, which is the household side, I wish it divided, at the first into a hall and a chapel (with a partition between), both of good state and bigness; and those not to go all the length, but to have at the farther end a winter and a summer parlour, both fair; and under these rooms a fair and large cellar sunk underground; and likewise some privy kitchens, with butteries and pantries, and the like. As for the tower, I would have it two stories, of eighteen feet high a piece, above the two wings, and goodly leads upon the top, railed, with statues interposed; and the same tower to be divided into rooms, as shall be thought fit. The stairs, likewise, to the upper rooms,—let them be upon a fair and open newel, and finely railed in, with images of wood cast into a brass colour; and a very fair landing-place at the top. But this to be,—if you do not point any of the lower rooms for a dining place of servants; for, otherwise, you shall have the servants' dinner after your own, for the steam of it will come up as in a tunnel. And so much for the front; only I understand the height of the first stairs to be sixteen feet, which is the height of the lower room."

Besides, Lord Bacon suggests that beyond the front there should be a fair court, three sides of which should be of much lower buildings than the front. He says, "Let the court not be paved, for that striketh up a great heat in summer, and much cold in winter; but only some side alleys, with a cross, and the quarters to graze, being kept shorn, but not too near shorn.

The row of return on the banquet side, let it be all stately galleries; in which galleries, let there be three or five fine cupolas in the length of it, placed at equal distance: and fine coloured windows of several works: on the household side, chambers of presence, and ordinary entertainments, with some bed-chambers: and let three sides be a double house, without thorough lights on the sides, that you may have rooms from the sun, both for forenoon and afternoon. Cast it also, that you may have rooms both for summer and winter; shady for summer, and warm for winter. You shall have sometimes fair houses so full of glass, that one cannot tell where to become to be out of the sun or cold. For embowed windows, I hold them of good use (in cities, indeed, upright do better, in respect of the uniformity towards the street), for they be pretty retiring places for conference; and, besides, they keep both the wind and sun off; for that which would strike almost through the room doth scarce pass the window; but let them be but few, four in the court, on the sides only."

Beyond this court, it is proposed that there should be an inward court, of the same square and height, which is to be environed with the garden on all sides; and in the inside, cloistered on all sides upon decent and beautiful arches, as high as the first story or the under story, towards the garden. "Let it," says Lord Bacon, "be turned to a grotto, or place of shade, or estivation; and only have opening and windows towards the garden, and be level upon the floor, no whit sunk under ground, to avoid all dampishness; and let there be a fountain or some fair work of statues, in the midst of the court, and to be paved as the other court was. These buildings to be for privy lodgings on both sides, and the end for privy galleries; whereof you must foresee that one of them be for an infirmary, if the prince or any special person should be sick, with chambers, bedchamber, 'antecamera,' and 'recamera,' joining to it; this upon the second story. Upon the ground story a fair gallery, open, upon pillars; and upon the third story, likewise, an open gallery upon pillars, to take the prospect and freshness of the garden. At both corners of the further side, by way of return, let there be two delicate or rich cabinets, daintily paved, richly hanged, glazed with crystalline glass, and a rich cupola in the midst, and all other elegancies that may be thought upon. In the upper gallery, too, I wish that there may be, if the place will yield it, some fountains running in divers places from the wall, with some fine avoidances. And thus much for the model of the palace, save that you must have before you come to the front three courts,—a green court, plain, with a wall about it; a second court of the same, but more garnished with little turrets, or rather embellishments, upon the wall; and a third court, to make a square with the front, but not to be built nor yet enclosed with a naked wall, but enclosed with terraces leaded aloft, and fairly garnished on the three sides, and cloistered on the inside with pillars, and not with arches below. As for offices, let them stand at a distance, with some low galleries, to pass from them to the palace itself."

ARCHITECTURAL PRIZES, PARIS.

The exhibition of designs for the grand prize took place on the 18th, 19th, and 20th of September. The subject was a bathing establishment. The prizes were awarded as follows:—First grand prize to Mr. Constant Moyaux, of Azin (Department Nord), aged twenty-six years, pupil of Lebas. Second grand prize to Mr. Jules Nicolas Flon, of Hainswilliers (Department Oise), aged twenty-three years, pupil of Guenepin. Additional second grand prize to Mr. François Wilbrod Chabrol, of Paris, aged twenty-six years, pupil of Lebas.

STEAM-POWER ON CANALS.

Notwithstanding the general introduction and use of railways, canals still continue to convey an enormous amount of traffic. Coals, in vast quantities, and of different kinds, are brought to, and taken from, London: building materials of all descriptions are carried about: wood for firing is taken in quantities which would surprise those who do not give much thought to the requirements of our monster metropolis: thousands of barrels of country ales are brought to town: piles of packages of manufactured goods; Birmingham wares; pottery wares; indeed, a hundred different commodities, in vessels of various sizes and description, which crowd these inland water-ways; and, notwithstanding the prognostics to the contrary, made by many when the railway system was proposed, there is still ample employment on the canals for some thousands of industrious men and women. It is strange, however, that but few efforts seem to have been made to get beyond the jog-trot of horses as a means of propulsion. We are well aware that there are difficulties in the way, such as the influence of the wash of the water on the canal banks; but experiments have occasionally been made which, ever and anon, we recollect, have been declared to have proved the possibility of obviating such difficulties.

In some of the tunnels—that, for instance, on the Regent's-canal, which passes below part of Islington, and in which there is no path for horses—a steam-engine has long been used. This tunnel is, however, of considerable size; and appears, so far as the writer can judge from having made two or three voyages through it, tolerably well ventilated. Besides this, those dwelling along the margin of the canal way have for some months past noticed that, to some of the barges of the Grand Junction Canal Company, small steam screw propellers have been fixed. The first of these vessels so constructed was the *Pioneer*; and since then others have been fitted in a similar way. By this means two barges are moved at the rate of from four miles to five miles an hour; and the plan is said generally to work well, and also to be very economical.

In connection with one of these steam barges an extraordinary accident has recently happened; causing two deaths and injury to other persons. It appears that on the Grand Junction Canal Company's line there is, at a part of the works near Blisworth, in Northamptonshire, a tunnel in which there is no towing path for horses; and, until steam propellers were brought into use, the barges were moved along by the extraordinary process called "legging." An old proverb says that one half the world does not know how the other half earn their bread: here is one of the proofs of the truth of the old saying: for how few of our readers have even heard of the business of a "legger." We doubt if, amongst the multitude of names of the different kinds of labour which are recorded by the Registrar General, this one is to be met with. The "leggers" are men who lie on their backs on the barges; and, by pushing with their feet at the top of the tunnel, move the boats along. Notwithstanding the deficiency of height, there is room for two barges to pass; but in one part of the tunnel the road was narrowed by some piles which had been driven in for the purpose of making necessary repairs: near this one of the steam vessels with a barge in tow met another barge in which the leggers were at work. An entanglement took place: the boat in tow of the steam was cast off and left behind: the smoke from the engine fire became dense, and so much affected the "leggers," that they could not work; and on board the steam-barge its effect was such that it suffocated two men, one of whom fell into the water and was not found until some time afterwards; while a young carpenter, who had been taken as a passenger, was found lying dead in the boat, his life destroyed by the want of proper ventilation for this steam traffic. Two engine-men besides were severely burnt, and a boatman suffered from the effects of suffocation and immersion. It is reported that this tunnel is only ventilated by a shaft near the middle; but that this being near the village, and being dangerous, has been hoarded by brickwork. No doubt, by some very simple means used in the restoration of this shaft to its proper use, the tunnel might be made safe for steam propulsion, and we trust that the "leggers" may then find some employment which will be more suitable for a human being. At any rate, if the steam service is to be brought generally into use, a careful examination of all the tunnels should be made in order that such accidents as this should for the future be prevented.

METROPOLITAN BOARD OF WORKS.

At the meeting of the Metropolitan Board of Works held on the 27th ult., the following report was presented from the Main Drainage Committee on the subject of the embankment of the Thames:—

"Your committee have to report that, in obedience to the resolution of your honourable Board of the 20th instant, referring to them for consideration the correspondence between the First Commissioner of her Majesty's Works, &c., and the chairman of the Board, on the subject of the Thames embankment, and as to the course to be pursued with reference to the proposed bill for carrying out the work, they have carefully considered the subject. The chairman of your honourable Board has laid before your committee a letter addressed to him by Mr. Baxter, the Parliamentary agent, stating that he had been instructed by Mr. Cowper to prepare the notices and arrange for the preparation of the bill; and that Mr. Cowper was desirous that he should consult with your chairman as to any suggestions which might occur to him with reference thereto; and, having reference to all the circumstances of the case, your committee, after much consideration, have arrived at the conclusion that the most eligible course to be pursued with reference to the proposed bill would be that the chairman should receive the communications which the Parliamentary agents for the bill are instructed by the Chief Commissioner of

Works, &c., to make to him, that he should consult with them as to the preparation of the notices and the draft bill, and should report from time to time to your committee; and they accordingly recommend that course for the approval of your honourable Board."

The motion was carried by a majority of 16 to 8.

A report was brought up from the Main Drainage Committee, recommending that the salary of the Clerk of the Board be increased from 400*l.* to 600*l.* per annum, and that the resolution of the Board of the 2nd December, 1859, be so far varied as to admit of such increase. This was carried.

The following are the sums which will be required from the different parishes and districts of the metropolis for the main drainage rate of 3d. in the pound for 1861-62, and for which precepts were ordered to be issued:—

City of London	£16,254	9	0
St. Marylebone	12,210	5	0
St. Pancras	10,008	0	0
Lambeth	7,962	10	0
St. George's, Hanover-square	11,796	4	0
Islington	6,857	3	0
Shoreditch	3,322	3	0
Paddington	6,580	5	0
Bethnal-green	1,629	0	0
Newington, Surrey	3,000	0	0
Camberwell	3,125	0	0
Westminster	5,393	15	0
Clerkenwell	2,767	3	0
Chelsea	2,928	2	0
Kensington	3,999	1	0
St. Luke's, Middlesex	2,144	11	0
St. George's, Southwark	1,825	0	0
Bermondsey	1,875	0	0
St. George's-in-the-East	2,128	8	6
St. Martin's-in-the-Fields	3,233	17	0
Mile-end	2,029	17	0
Woolwich	1,037	10	0
Rotherhithe	1,043	15	0
Hampstead	1,301	19	0
Whitechapel	3,152	4	3
Westminster district	3,413	5	0
Greenwich district	3,037	2	6
Wandsworth district	4,517	10	0
Hackney district	3,680	10	0
St. Giles's district	2,271	4	0
Holborn district	2,245	10	9
Strand district	3,354	7	0
Fulham district	1,671	10	0
Limehouse district	2,225	12	3
Poplar district	3,406	6	0
St. Saviour's district	2,050	0	0
Plumstead district	1,311	12	6
Lewisham district	1,907	10	0
St. Olave's district	1,246	5	0
Charter House	24	7	0
Gray's-inn	158	9	0
Collegiate Church, St. Peter	17	15	0
Inner Temple	252	19	0
Middle Temple	162	10	0
Lincoln's-inn	205	5	0
Staple's-inn	26	18	0
Furnival's-inn	39	11	0
Total	£155,749	0	9

SOME NOTES ON FURNITURE AND HOUSE-FITTINGS.

As regards chimneys, it is difficult to learn the precise period at which they were invented. For stoves we are indebted to the ingenuity of the Germans, and other northern nations; and, as early as 1388, we find them in use in the royal residences and galleries of Paris. Benches and stools were formerly the most common seats, even in the palaces of princes: chairs were very rare conveniences. The bed, which is now an article of furniture so requisite that not even a labourer's hut is complete without it, was an object of luxury with the Greeks and Romans, who readily adopted mattresses, feathers, and beds of down, as substitutes for the couches of leaves and skins on which their more hardy ancestors reposed. The bedsteads were costly; some were of ivory, some of silver, and others were made of ebony or of cedar.

The earliest coverings with which the walls of rooms were hung consisted of rush and straw mats, the colours being chosen with taste and blended together with great skill. Some of this description of manufacture may even now be found in the Levant, where they value them for the vivacity of their colours, and the beauty and symmetry of the figures on them. Although hangings of needlework were in use in England by the Anglo-Saxons, linen and silk tapestries were not generally used till about the twelfth century. In the fifteenth century a kind of tapestry, termed *haute* and *basse lisse* was invented in the Netherlands, which was quickly introduced into France: it was of very high price; and, consequently, far above the reach of persons who were in but middling circumstances. But the most noted kind, and which eclipses the productions of any other age or country, is the manufacture of the Gobelins, which was established in France under Henry IV. Colbert, aided by the talents of Le Brun, the painter, brought this description of house decoration to a great state of perfection. Damask was an article much used: it took its name from the city of Damascus, in Syria. In addition to these may be mentioned the Venetian brocatelle, the printed linens of Persia and India, the tapestry constructed of the cuttings of coloured woollen cloths attached to canvas with gum, and embossed, painted, and gilt leather. This was used in Spain before its introduction into this country.

Of mirrors or looking-glasses—the first were of polished metal: we find Moses makes allusion to them. Mirrors of polished silver were first used by the Romans in the time of Pompey. Metal mirrors may be seen amongst the Egyptian, Greek, and Roman antiquities; and Pliny speaks of shining stone being adopted for the reflection of objects. This probably was talc, which may be separated into very thin laminæ, or scales; and when laid upon metal would have power sufficient to reflect objects tolerably well. It is, however, to the Venetians that we are indebted for the manufacture of our modern mirrors. They, it appears, were the first in Europe who became possessed of the secret of manufacturing them with glass and the metallic composition now usually adopted. Towards the conclusion of the crusades mirrors of crystal were imported into Europe.

A quaint writer of the sixteenth century observes respecting a few of these articles of domestic convenience,—"What a multitude of chimneys have lately been erected! Why, in my young days there were not above two of them, if so many, in many uplandish towns of the realm (the religious houses and manor places of the lords always excepted, and, peradventure, some great personages). And as to lodging, why, our forefathers, and we ourselves, have lain full oft upon straw pallets, covered over with a coarse brown sheet, under coverlets made of dogswain, and a good round log under their heads instead of a bolster. If it were so with the good man of the house that he had a mattress or flock bed, and thereto a sack of chaff to rest his head upon, he thought himself as well lodged as the lord of the tower, so well were they contented. As for servants, if they had any sheets above them, it was well, for seldom had they any under their bodies to keep them from the pricking straw that ran through the canvas." And further he says, speaking of the exchange of wooden platters into pewter, and wooden spoons into silver and tin; "so common were all sorts of wooden vessels in old time, that a man should hardly find four pieces of pewter (of which one was, peradventure, a saltbox), in a good farmer's house."

SANITARY CONDITION OF SHREWSBURY.

Working on the statements we have made, the *Shrewsbury Chronicle*, we are glad to see, is urging on the town. "To see ourselves as others see us, may," observes the *Chronicle*, "sometimes be as salutary as it is always curious; and on this account the articles which we took the liberty of extracting from a London contemporary, the *Builder*, a few weeks ago, possess a peculiar value. They are the impressions of an intelligent stranger, who visits us for the first time; knowing nothing further about Shrewsbury than that it ranks amongst the highest of those towns in which the rate of mortality exceeds the average. Indeed, it was probably into the causes of this unenviable position that he was specially commissioned to inquire; and, if so, he may perhaps be excused for passing over the more agreeable features of what we must still consider our fine old town, to dwell so much at length on its more repulsive features. But what a picture did he present to us! Open channels in the public streets, festering with mud; untrapped gratings steaming forth their fetid exhalations to poison the surrounding atmosphere; footpaths impassable for filth; courts and alleys without the accommodation decency demands; and cesspools and manure heaps polluting the air and offending the eye, where such things ought never to exist! And yet who shall say the picture is not true? Nay more, is it not still imperfect; and might not we, who are necessarily more intimately acquainted with the place, easily add one or two touches to the sketch by way of rendering it complete? But the task is not to our mind, and the readers of the *Chronicle* must fill it in as they please. It is sufficient for our present purpose that the familiarity which begets indifference to such a state of things has no weight with the stranger; and it is mere childishness to feel angry at the exposure. Let us rather thank him for his candour; and digest, as we best may, the unpalatable truth; taking care at least to profit as far as possible by the lesson. For nothing can be more easy than this. Sanitary economy is a science by no means difficult to understand: its laws are so clear and its results so palpable, that those who run may read; and the neglect of its principles bears the same relation to disease as ignorance to crime. In many instances, indeed, it is the sole cause."

"It was in the year 1853 that the inhabitants of Shrewsbury suddenly woke up to a sense of their disgraceful position in sanitary matters. The Board of Health was memorialized on the subject, and a commission of inquiry was instituted. The facts brought forward on that occasion will be familiar to most of our readers. There could be no doubt about the matter: something must be done: the Public Health Act must be enforced, or we must grapple with the evil ourselves; and so the latter course was adopted, as opening the widest path for a little political jobbery,—and hence came that miserable thing of shreds and patches called the Shrewsbury Improvement Act.

And what has it effected? Of good, nothing—of evil, much. Has any one of the nuisances, we would ask, of which the gentlemen just mentioned were induced to make special complaint been yet removed? Has one single sewer been laid down? Is fever less rife in certain localities than formerly? In a word, is the mortality of Shrewsbury yet reduced to a level with that of other towns? or has any attempt been made likely to effect such a purpose? *None!* But something has been done: *the rates have been rather more than doubled:* that is to say, that whilst the rate under the old Street Act averaged, for the last five years it was in force, a little over 10d., the Improvement rate during a like period has reached an average of more than 1s. 8d. in the pound. And little wonder, when we look to the machinery by which it is worked."

CHURCH-BUILDING NEWS.

Thurston (*Suffolk*).—The restored church of Thurston has been reopened. The restoration, or rebuilding rather, was effected under the direction of Mr. Hakewill, architect; Mr. Farrow, of Bury, having executed the works. The details of the original structure have been adhered to generally, except in a few minor features of the exterior and in the fittings of the interior. The roof has been raised again some 6 or 7 feet; thereby diminishing the apparent height of the tower, which, however, is slightly increased. The walls are faced with undressed flint, with stone arches and quoins, up to the string-course, above which the flints have been dressed. Two bands of red brick have been introduced to give additional strength. The arches are of red brick alternated with dressed flints above the dripstones of the windows. In rebuilding the tower, in which later work had been introduced, the architect has restored the original design both in the buttresses and in the traceried windows of the belfry. Inside the church the old stones of the pillars have been replaced, except unsound ones. The whole of the area of the new nave is thrown open, and filled with oak benches with carved poppy-heads; the chancel, which remains much as it was, being furnished with the original stalls. The organ, which fills the north-west corner, is almost entirely reconstructed; the fall of the tower having nearly destroyed the former one: the builder was Mr. Cotton, of Yarmouth. Above, a simple waggon roof of stained wood has been substituted for one of the Perpendicular style, with cross-beams and carved openwork; and the carved ends of the corbels have been replaced. The floor of the church contains a slab to the memory of the vicar, whose remains were laid beneath it before the work was completed.

Ely.—The lantern tower of Ely cathedral is about to be rebuilt. The cost will be between 5,000*l.* and 6,000*l.*; and the first portion of the work has been entrusted to Messrs. Freeman & Son, of Ely, builders, who are commencing the preliminary staging and scaffolding. The architect is Mr. G. G. Scott. The new lantern, like the present one, will be of oak and cased with lead; the windows will be Gothic. The roof of the nave of the cathedral and the inner ceiling are now under repair. The decoration is the work of Mr. W. Le Strange, of Hunstanton. New chorister schools and master's residence, we may here add, are in progress in the High-street; the architect being Mr. G. W. Fawcett, of Cambridge.

Fordham (*Essex*).—The church here has recently undergone internal and partial external renovation. The chancel has had the thick coat of plastering removed from the outside; and the flint work, which was found to be in good condition, has been fresh pointed in blue mortar, and restored. A new coping has been placed upon the

east gable, and the old cross restored. The windows throughout have had new tracery heads, and the old mullions re-worked and filled with cathedral glass. A new east window, the gift of the rector, the Rev. W. H. Herring, B.A., has been added, with a border of stained glass, and filled with I.H.S. quarries, intermixed with others of a suitable pattern. The old high pews have been removed, the floor of the church throughout raised four inches as a preventive of damp, and the aisles paved with red and buff Staffordshire tiles. Open deal benches, stained oak colour and varnished, have been substituted for the high pews, thus giving fifty additional sittings; and in the chancel, benches with carved poppy-heads have been introduced of pitch pine and stained. The arches to arcades have been cleaned and restored, and the tower arch at the west end, which has hitherto been blocked up and plastered over, has been opened and restored. The north doorway has been re-opened, and new oak door added. The whole of the work has been carried out by Mr. Joseph Grimes, of Colchester, builder. The cost of the restoration exceeds 700*l.*

Kettering.—A new Baptist chapel has been opened at Kettering. The chapel was commenced in May, 1860. It was built according to designs and under the superintendence of Mr. Edward Sharman, of Wellingborough, architect; Mr. W. S. Peebles, clerk of works; Messrs. Henson, Buswell, & Buckby, contractors. The style may be said to be Lombardic, with Gothic in the details. The front is built of Ancaster stone, ornamented by a pediment with a one-storied porch, the whole enriched with coloured tiles, and some carving. The chapel will seat about 850 people. It is 70 feet long, 50 feet wide, and 30 feet high under the tie-beams, with a covered panelled plaster ceiling, and a second cove rising as high as the collar-beams, at which level there are four skylights, which light the upper cove, and serve the purpose of ventilation. The minister stands in a semi-circular carved oak platform, projecting from an ornamented Caen stone recess, with approach from behind. The end gallery and seats under are semicircular in plan. All the interior woodwork is of clear varnished deal or oak. It is lighted by pendant starlight gas-burners, and heated by water-pipes. Behind and adjoining the chapel is a deacons' and minister's vestry, and lecture-room, 40 feet and 20 feet, and a school-room over, 90 feet and 20 feet. The whole cost, including materials from old chapel, is about 4,000*l.*, raised by voluntary subscriptions.

Stopsley (*Beds*).—At one extremity of the village of Stopsley a church has been lately erected, from designs by Mr. Hy. Pearson, of Luton, architect; and the work has been done by Mr. E. O. Williams, of the same town. The style chosen is Early English. The church consists of nave and chancel, built of grey brick, with freestone dressings. The length of the building is about 80 feet, and the height to the ridge of the roof about 40 feet. The west gable is terminated by a bell turret, and the east gables by ornamental crosses. The stone pulpit is divided into panels by dog-tooth ornament: these are charged with monograms and sentences, coloured.

Littlehampton. — Rustington church, after having undergone a repair and renovation, has been reopened. The repairs included entire re-roofing. Of the other parts, the plan adhered to has been, as far as possible, to preserve the original designs, with open seats. The pulpit and reading-desk are of old oak, from the cathedral *débris*, in Gothic, and the communion chairs are of the same material, from Etchingham church, before its restoration, and the design is "constructed without the aid of glue, nail, or peg." The mural monuments are many, and have had attention. The cost has exceeded 1,300*l.*

Tottenham (*Wilts*). — The memorial church which has been built by the Marchioness of Ailesbury to the memory of her mother, Katherine, Countess of Pembroke, was consecrated on the 24th ult. It is ultimately to be a district church, and will supersede the private chapel till lately existing in the house at Tottenham. It is a large structure, consisting of nave, north aisle, north and south transepts, chancel with eastern end of polygonal form, vestry, and robing-room. The tower, placed at the angle of the nave and south transept, forms in its lower stage the porch, giving entrance to the nave and south transept. The tower is surmounted by a spire, reaching to a height of about 120 feet. The church is faced with flint, relieved by horizontal bands of Sarsen stone, with Bath stone quoins, &c.; the windows, buttresses, and all the moulded stone work, with the spire, being of Bath stone: relieving arches of red, green, and grey stone are introduced over all the openings of the doors and windows. The whole of the interior walls of the church are lined with Bath stone. The roofs are of open timber-work, boarded, and with carved bosses and spandrils; there being no plastering used in any part of the building. The roofs are covered with dark-coloured tiles of different forms: the chancel roof is crested with gilt ornamental iron work. The spire is surmounted by a carved finial with iron gilt vane. At the east end of the exterior of the chancel is a broad flight of steps, flanked by spandril walls, enclosed by ornamental iron railings and gates, leading to the family vault, which extends under the whole space of the chancel. The style of architecture adopted is Geometric. Internally the transepts are separated from the nave by stone screens, filling up the whole area of the arch; the tracery being supported by four marble shafts of red colour, with carved capitals. The responds of arcade between the nave and north aisle are also of red Devonshire marble, and the carved corbels of the nave roof have similar shafts of marble resting upon them. The chancel arch mouldings are carried by carved stone corbels and red marble columns. The five sides of the eastern end of the chancel are finished by a reredos of deeply-coloured majolica tiles of ecclesiastical design, surmounted by a text, also executed in majolica. The whole body of the nave and chancel is paved with Minton's tiles, of varied design; those in the chancel combining rich patterns, in which blue, green, and white are introduced with the union of other colours. The gangways in the aisle, transepts, &c., are also paved with Minton's tiles. In the north transept is placed the organ, from the manufactory of Bevington & Sons, of London. The windows throughout the church are of stained glass, and contain whole-length figures and subjects taken from the Old and New Testaments. Of these windows thirteen are by Messrs. Lavers & Barraud, three by Messrs. Heaton & Butler, two by Mr. A. Gibbs, and one by Mr. O'Connor. In the entrance porch, and under a groined ceiling of stonework, is placed the memorial, in a crocketed canopy, surrounded by various sculptured emblems and supported by angels. It is of marble, dove-coloured, and the inscription is in gold letters. The church has been erected by Mr. Daniel Jones, of Bradford-on-Avon, from plans and elevations furnished by Mr. T. H. Wyatt, architect. The various tiles of Minton and majolica ware in the floors, reredos, &c., have been all arranged and laid out by Mr. William England, of London. The carvings and sculptured works of the church, in wood, stone, alabaster, and marble, were executed by Mr. G. A. Howitt, of Devizes, who also did the pulpit, font, altar-rail, credence-table, poor-box, &c., &c.

Devizes.—The building committee for the restorations of St. John's Church have entered into a contract with Mr. Mullins, the builder, for a portion of the works contemplated, at a cost of 1,736*l.*; viz., to rebuild the arcades, to put a new roof on the nave, to extend the nave and aisles one bay to the westward, and to seat the new bay, according to the specifications of Mr. Slater. There was a deficiency of funds for these works; but the late rector guaranteed 100*l.* in addition to his former contribution of 25*l.*; and the new rector guaranteed 100*l.*

Cricklade (*Wilts*). — Latton Church has been restored and re-opened. During the incumbency of the present vicar, the south side of the nave has been rebuilt, the tower opened, and the transepts restored. A new chancel has been added. The architect is Mr. Butterfield, who has superintended the whole of the restorations. One step leads through the ancient Norman arch into the choir, which is fitted with stalls of carved teak. The roof is supported by open timber work. Two steps then lead through a pointed arch into the sanctuary, the roof of which is of stone vaulting, with pointed arched ribs. Another step leads to the footplace, where the altar stands on a slab of Purbeck marble, surrounded by encaustic tiles. The walls of the sanctuary are ornamented with encaustic tiles. The east window is fitted with stained glass, by Mr. A. Gibbs, of London. One of the south windows of the chancel, also by Mr. Gibbs, is a memorial window presented by Mr. J. Habgood, of Faringdon. The whole of the works have been executed by local workmen, under the superintendence of Mr. John Roseblade, of Latton, the builder.

Hawkchurch (*Dorset*).—The chief stone of a new church has been laid here by Mrs. Adams, wife of the rector of Hawkchurch. In the early part of last year, the Rev. E. C. Adams stated to a vestry meeting the bad state of the church, and said if they would agree to have a new church the tower would remain, and the whole amount which he, Mr. Adams, would ask the rate-payers for would be only 250*l.*, the parish to be allowed four years to pay that amount. The church would cost somewhere about 2,000*l.*; and by the parish paying 250*l.*, and the amounts that he should get from the Salisbury Diocesan Fund, and from the Building Society in London, he hoped to be enabled to carry out the works. The meeting agreed to make a church-rate towards the 250*l.*, that sum to be paid in four years. The tower was repaired in the latter part of last year, but the church was allowed to remain until July last, when it was found to be in a very bad state, and was pulled down. The contract for the new church has been taken by Messrs. Chick & Sons, of Beaminster, builders, for 1,936*l.* The stone work has been taken by Mr. Patten, of Bridport, builder, from Messrs. Chick & Son, and Mr. Trask, of Stoke-under-Norton, is going to supply Ham-hill stone required. The building is now going on under the direction of Mr. Patten.

Lindridge (*Worcestershire*).—The parish church has been rebuilt from the foundation upon an enlarged plan, and consists of a nave and south aisle, with tower and spire at the south-west angle, chancel, vestry, and organ chamber, with a crypt under the latter for warming the church. The design is Decorated Gothic. The walls are built externally with native stone, laid as random-ranged work, the various dressings being executed in free stone. All the interior constructional work and facings to walls are executed out of Bath stone. The roofs are framed of oak, all the timbers being visible, lined with oak boarding, set diagonally, and covered externally with tiles. A sheeting of Croggon's felt is laid between the tiles and oak boarding, to exclude draughts and regulate the temperature. The sittings are all open, and arranged to accommodate nearly 400 persons. The several floors will be cased with encaustic tiles. The south aisle is divided from the nave by a double arch, springing from carved wall corbels, and carried in the middle upon a pillar with foliaged capital. It presents two gables to the south, with a three-light tracery-headed window in each. The nave has to the north three two-light tracery-headed windows, and a four-light window to the west. The chancel is divided from the nave by a wide arch, springing from enriched corbels. The east window of the chancel is composed of five lights, with tracery; and on the south side of the chancel are two two-light tracery windows; the easternmost one finishing inside as a sedile. Between the two windows is a priest's door. An archway decorated with ball flowers opens into the organ chamber on the north side. The tower is divided into three stages, the lower being used as a porch; the west wall pierced with a two-light window; and the next stage will be used as a ringing loft, and is approached by a geometrical stair. From the tower springs a broach spire, pierced above the broach with four spire lights. All the windows throughout will be filled with painted glass. The church has been erected from the designs and under the superintendence of Mr. Thomas Nicholson, diocesan architect, Hereford.

Bromsgrove.—The new Primitive Methodist chapel, lately opened here, is built of red relieved with white and blue bricks; partly in the Italian style of architecture; and, rising to the height of 44 feet, is lighted by twelve windows. The works have been carried out under the direction of Mr. Bowater, of Wolverhampton. The length of the chapel is about 46 feet, and the width 31 feet. A school-room is underneath the chapel. The chapel and house, when completed, and the chapel fitted up with seats and gas fittings, will cost 700*l.*

STAINED GLASS.

St. Mary's, Newfoundland.—Messrs. D. Evans & Sons, of Shrewsbury, according to the local *Chronicle*, have forwarded two windows for the church of St. Mary, Newfoundland. They had previously supplied the stained-glass windows of the cathedral there. The windows are two single lancet lights, 12 feet by 2 feet; the one containing the figure of our Saviour as the Good Shepherd, and the other St. John the Baptist. The under garment of our Saviour is white and the upper a ruby. St. John's consists of his usual garments of camel's hair, and a blue mantle. Each figure stands under a foliated canopy on a diapered ground; the back being also diaper work. The whole is surrounded by a border. The windows were ordered by the Rev. J. Pearson, incumbent of St. Mary's Church, St. John's, Newfoundland, where they will be placed.

The Old Church, Ayr.—Some time ago it was

resolved to supplement the recent additions to the decoration of this church by putting in an illuminated window behind the Trades' loft. The promoters of the improvement had several designs submitted for inspection, and selected that supplied by Messrs. Ballantine, of Edinburgh. The shields and mottoes of the incorporated trades have been placed in the base; whilst scriptural illustrations and texts have been introduced in the chief portions of the window. On the one side David is represented singing; and on the other Solomon is delineated as dedicating the temple. The design is of early character.

PROVINCIAL NEWS.

Colchester.—The contract for the formation of the artesian well in connection with the new system of waterworks, for the old and new camps at Colchester, according to the *Chelmsford Chronicle*, has been taken by Mr. Clarke, of Tottenham, and the work will be proceeded with immediately. The plans for the new cavalry barracks have been agreed upon; and the contracts for the works are likely to be taken within a few weeks; it being the determination of the War authorities to expedite the erection of the barracks as much as possible before the arrival of winter. There is no intention of increasing the infantry accommodation, which is now sufficient for 3,000 men. The new camp will be constructed upon an elevated plot of ground immediately adjoining the infantry barracks; affording every facility for the most perfect drainage; and having, it has been asserted, an almost exhaustless supply of water.

Winchester.—The want of sufficient accommodation in the Hants county hospital, and a proposal to erect a new hospital on another site, are at present under consideration.

Mathon.—New schools have been opened here. The buildings are of a simple character, and were designed by Mr. W. J. Hopkins, of Worcester, architect; the builder being Mr. George Warner, of Malvern Link.

Liverpool.—It may be remembered that one of several projects submitted by the local improvement committee, for the consideration of the council, consisted in the formation of a new street or road from Smithdown-lane to West Derby-road; and, although the scheme as a whole was much criticized and condemned, this portion of it is now in course of execution. Workmen have commenced operations at the West Derby-road end of the promised new route. The new road commences close to the Newsham House gate, and immediately opposite to the Belmont-road, from Richmond-hill, of which it will be a continuation. It strikes through the fields in a straight line to the Old Swan-road, in the neighbourhood of Kensington, and terminates at the junction of Lodge-lane and Smithdown-lane. The new road, or street, will be 60 feet in width, and its exact length 1 mile, 4 furlongs, and 14 yards. It runs for a great part of its course through land belonging to the corporation. It is intended to construct a substantial sewer along the entire length of the proposed new road.

Birmingham.—The music hall was lately offered for sale by public auction, by Messrs. Fallows & Smith; but a sufficient sum was not bid to induce the proprietors to sell. The hall has since, however, been disposed of to a Birmingham gentleman for 3,400*l.* The original cost of the building was upwards of 12,000*l.* The hall will be available for the same purposes as heretofore.

Bolton.—The new workhouse at Fishpool, for the Bolton Union, has been opened. The cost of the land, building, fittings, &c., has been upwards of 32,000*l.*, the accommodation being for 1,000 inmates. Mr. Robert Neill, of Manchester, has been the contractor; and Messrs. Leigh, Hall, & Woodhouse were the architects.

FALL OF AN IRON BRIDGE AT YORK.

A FRIGHTFUL accident took place on Friday in last week, in connection with the new bridge in course of construction at Lendal, York. The bridge, which was to cross the Ouse at Lendal Ferry, in the line of a new street from the railway station to the cathedral, was, as we have before intimated, on the lattice girder principle of Mr. Dredge; and the present is the first example of a girder bridge which has been thrown across any river in England. The construction of the girders was carried on so that when completed they might stand like walls of iron trellis-work across the water; and as each was completed it was, by means of hydraulic power, raised from its supports, which were then taken away, and the iron gradually lowered to its place upon steel rollers let into the buttresses; this description of bed being adopted for the purpose of allowing of the contraction, expansion, or depression of the iron when under the influence of heat or cold or excessive pressure. Only a short time ago two of the four girders of which the bridge was to consist were completed and successfully lowered to their places; and, as these were the heavier portions of the lattice-work, which were to divide each side of the road from the footpath, it was naturally anticipated that the main difficulties in connection with the structure were over. There, however, remained two lighter girders to complete; and one of these was ready, and was in the course of being lowered at the time when the accident took place.

The outer or footway girders still remained on "chocks." It was agreed to remove the "chocks" or wedges connected with one of the lattice girders, so as to place it in its final position. Prior to the completion of this operation Mr. Pickersgill, the city surveyor, and Mr. Ackroyd, his assistant, had passed over the bridge, and just departed, when Mr. Moore, the clerk of the works, in the employ of Messrs. Calvert, the contractors for the construction and the erection of the ironwork, and who was superintending the workmen, directed that the remaining "chocks" should be taken away on the west side of the river. For this purpose the hydraulic engine on the spot had to be brought into requisition. The girder was raised: a few wedges or packings alone remained to be removed; when a low rumbling sound was heard to emerge from the structure; succeeded by a tremulous motion of the moving girder, which directly after careened over on to the other adjoining one (although stayed by 11-inch beams); which in its turn carried away the next; and this giving way also, the outer girder was forced over, and fell bodily with a terrific force into the water, carrying everything before it. Huge beams cracked and snapped like dried twigs, and all the massive scaffolding, with its iron supports, and the side of the ponderous gantry were brought down with a tremendous crash, as was also directly afterwards one of the immense travelling cranes. Thus in a few moments the lattice girder bridge, which for so many months has been in course of construction, and the completion of which was shortly to have been fulfilled, disappeared, leaving only a bare wreck behind.

Six persons have been killed by this lamentable accident, and several others injured.

BUILDING ACCIDENTS.

SEVERAL accidents have of late unfortunately occurred at the Exhibition building. In one case a workman, whilst engaged on one of the lofty scaffolds hauling up timber, together with two others, walked backward, fell from the scaffold to the ground, a distance of upwards of 60 feet, and was killed on the spot. Other two men appear to have been seriously injured on the same occasion. Accidents of a similar nature have since occurred to other workmen, but none of them were killed.——A workman, employed on the works of the Metropolitan Underground Railway, while working on the top of one of the lofty shafts, by some means overbalanced himself and fell from the top of the shaft, a distance of 60 feet, into the tunnel. The poor fellow was crushed in an awful manner, life being quite extinct.——On Wednesday morning, Mr. Brent, the deputy-coroner, opened an inquiry, at the boardroom of the Royal Free Hospital, Gray's-inn-road, touching the death of Edward Richard Hodgkinson, aged 33, a painter, who was killed in the stoneyard of Messrs. Cubitt, Gray's-inn-road. It appeared that the deceased, along with some other men, was engaged on Friday afternoon last painting the framework of a new stone-cutting machine. The deceased and a smith put up a ladder against one of the rails; and just as the smith was in the act of leaving, two very large and heavy stones fell and struck him, breaking his legs. The deceased was knocked off the ladder, and one of the stones fell on him. They were both taken to the Royal Free Hospital. The deceased expired in about an hour after he was admitted. The jury returned a verdict of accidental death, and expressed a hope that more care would be taken for the future to see that the stones were safe.

CHERTSEY ABBEY.—The result of the excavations on the site of this abbey has been to expose the foundations of the east end of the church and part of the cloisters; and a large quantity of encaustic tiles, pieces of sculpture, &c., has been found.

STRENGTH OF CAST-IRON COLUMNS.

SIR,—In a recent impression you gave us a paper of Mr. Sheilds's, as to iron construction, read at the meeting of the British Association, which, on its perusal, rather led me to a disappointment. After reading the paper, I have come to the following conclusions, which are based upon probably as much experience and practice as our author may boast of:—

1. That columns of cast-iron, 20 to 24 diameters in length, with flat ends and base plates, and with ¾-inch metal, will bear with safety not merely 2 tons per square inch of metal, sectional area, as he would advise, but 4 tons per square inch of metal. The actual *breaking weight*, as deduced from the most reliable and recent experimental resources, is, for columns of this form, about 16 tons per square inch of section. And this (if he be an engineer) he ought to have been aware of when he wrote the paper in question. (See Rankine and others).

2. That cast-iron arches, *well braced* and kept in a truly vertical position under their load, are quite as able to take 5 tons (and not, as Mr. S. says, 2½ tons) per square inch of sectional area of metal, as are wrought-iron ribs loaded with 4 tons per square inch of sectional area. But it must not be the cinder iron which seems uppermost in our author's mind, but *bonâ fide* cast-iron, made of mixed ores and of uniform quality. This is superior under a compressive strain to any (even the best) wrought-iron, as all manufacturers and engineers well know. All designs and drawings should assume good material, and insist upon it, thus designing *up* to a perfect article, and not *down* to a bad one.

3. Small castings (that is to say, of thin scantling) are generally made of better quality than large ones; and are, therefore, able to bear comparatively a greater weight, and not the reverse of this, as our teacher at Manchester inculcates. This is patent to all who know what iron is, and does not want any enlarging upon.

4. The system of designing the middle section of an arch as a girder of a corresponding span, as suggested apparently for the first time, is now somewhat antiquated; and the wrinkle, if of worth, might have been learnt by Mr. S. a long time ago; as witness the works of Mr. Page at Westminster New Bridge, and many others.

IRON AGE.

*** We believe, notwithstanding the assertion of our correspondent, that the practice of many of the best engineers coincides with what Mr. Sheilds has stated in his paper; and that it is the custom of eminent bridge builders, including Mr. Edwin Clark, Mr. Fowler, and Mr. Page, to keep the pressure on cast-iron arches within 2½ tons per square inch. Again, few men were better versed in this subject than the late Mr. Brunel, who was in the habit in his extensive practice of loading columns to 1½ ton per square inch only; and the experience of Mr. Sheilds himself at the Crystal Palace, where vast numbers of columns were tested by every variety of live and dead loading, ought to be of much value. Thin columns are not necessarily cast of better quality than thick ones; and the liability, common to all columns, of being cast thicker on one side than on the other renders thin columns peculiarly subject to the risk of wanting, in some portion of their circumference, the requisite thickness for stability. This danger occurs especially at the centre of the column's length, where the liability to bend or buckle is greatest: it increases as thinner columns are used, and therefore necessitates increasing precaution in using them.

TRAMWAYS IN ST. SAVIOUR'S, SOUTHWARK.

ON perusing my *Builder* of last Saturday's publication, I observe at page 672 an article under the head of "The Tramway System," in which you allude to a new sort of tramway being laid in Blackfriars-road.

I beg to inform you that this District Board of Works (St. Saviour's), with a view of testing the durability of iron and stone trams, when laid in a situation in which the iron and the stone would have about the same amount and sort of traffic and wear, ordered Mr. Stephen Cary, of Clink-street, Southwark, to lay iron trams in blocks 18 inches by 18 inches, part of them 7 inches deep, and the other part 5 inches deep, from the south side of Stamford-street to Holland-street, on the west side of Blackfriars-road, about 280 feet in length.

And also ordered Messrs. Mowlem & Co. to lay in continuation of the line northward to Upper

Ground-street about 184 feet of granite trams, in blocks 18 inches wide, 12 inches thick.

The whole of the paving between the trams and on each side thereof have been laid by Messrs. Mowlem & Co.

The southern half of the length of the granite trams are of Guernsey, and the northern half of Aberdeen blocks; but without any intention on the part of this board to extend it southward, at least for the present.

These works have been carried out under my direction.

John Howe, Surveyor to the Board.

SUBWAYS FOR LONDON.

In support of the recent pleas for protection to the public against the wholesale destruction of our roadways by Gas and Water Companies, I have extracted from Parliamentary return, No. 519 of the last session, "Gas and Water Companies (Metropolis)," the following statement:—

Parishes.	Amount received by Vestry for Repair from Companies in the five Years, 1856–60.	Number of Trenches opened in the five Years, 1856–60.
St. George's, Hanover-sq	£3,361	16,801
St. James's, Westminster	2,541	8,151
St. Pancras	2,904	15,879
Lambeth	1,362	no record.
Islington	1,725	14,791
Paddington	1,142	8,270
Chelsea	2,560	6,697
Kensington	1,116	7,538

These are a sample showing the wholesale destruction of either solid, well-formed roads, or of newly-formed macadam surfaces. The parish of Marylebone and some others have made no return. Wherever you turn, eastward or westward, the return tells the same tale. Is there no remedy? Are our streets for ever to be at the mercy of the first invading company? The only legitimate remedy seems to be, either in the compulsory use of double-turned and bored joints to prevent escapes, or some other improved pipe joint to that in vogue, or a permissive Act sanctioning subways and referring to the arbitration of the Board of Trade the quotas to be contributed by companies and parishes to carry out the same. Your influence will be a great incentive to legislative and parochial aid. I commend the Parliamentary paper quoted to the study of all intent on reducing to a minimum the annoyances which culminate at this season of the year.

A Vestryman of St. James's.

ARCHITECTS' RESPONSIBILITES: REFUSAL OF CERTIFICATES.

Pawley v. *Turnbull and Hey.—Vice-Chancellor Stuart's Court.*—Although some time has elapsed since the settlement of this case, some of our readers may find it useful to know that a notice of it, with the summing up in full and decision of the Vice-Chancellor, appears in the *Jurist* of August 17, 1861, p. 792. The following is the legal abstract of the case:—

"C. P., in July, 1858, entered into a contract to build, in consideration of the sum of 2,590*l.*, four houses for the defendant T., to be paid by him by instalments, on the certificates of W. H., at the rate of 75*l.* per cent. on the value of the works executed; and the defendant W. H. was employed by him as architect, and he was to be the sole arbitrator in case of disputes arising. The houses were to be erected, in accordance with certain plans and specifications, on or before the 30th November, 1858, under the direction and to the satisfaction of the defendant, W. H. If extra works were ordered by the defendants, they were to be executed by the plaintiff; and an extension of time, if necessary, was to be allowed. The plaintiff was to pay a forfeit of 10*l.* a week, to be deducted from the contract money, if the houses were not completed by the 30th November, 1858; and the defendant T. was likewise to be at liberty to employ workmen and find materials to complete the houses, and to deduct the expenses therefrom. The houses were erected, but not completed, on the day specified; in consequence, as alleged by C. P., of his not having had possession of the land. Extra works were executed of disputed value. W. H. withheld certificates beyond the sum of 1,420*l.*, or rather more than one-half of the contract price. The plaintiff, in January, 1859, employed surveyors to inspect the houses; and they certified that the expenditure of about 400*l.* was required to complete them. W. H., on the 10th February following, took possession of the houses, in consequence of the disputes which had arisen between him and C. P. in reference to the erection of them, and the withholding of certificates. The evidence of surveyors showed that the houses were of good quality and materials, and that the conduct of W. H. had been improper and unfair in the exercise of the powers contained in the contract. And the Court declared that the plaintiff was entitled to recover the contract money, and the sum of 190*l.* for extra works, less the sum paid to him, and such other sum as could, on the 10th February, 1859, have been fairly expended in the completion of the houses; and ordered an inquiry as to whether the sum of 248*l.*, or any and what sum, had been properly expended, and ought to be claimed by the defendant T., in the completion of them. The Court refused to allow the defendants to claim penalties in such a case, and would not reserve further consideration."

MASTERS AND WORKMEN.

Light v. *Roper and Others.*—In this case, tried in Westminster County Court (before F. Bayley, Esq., Judge), the plaintiff, Charles Light, a journeyman bricklayer, sued the defendants, Messrs. Roper & Son, extensive builders and house decorators, Wardour-street, Oxford-street, to recover the sum of 11s. 1d., alleged to be due under the following circumstances. Mr. H. T. Roberts, solicitor, attended for defendants. From plaintiff's evidence it appeared that in May last he was engaged by defendants to go to a job at Rillington, Yorkshire, the nature of which was, alterations and additions to Scampton Hall, the mansion of Colonel St. Quentin. After being there ten weeks he was suddenly discharged, and his fare by train up to London paid, but he was not paid for his thirteen hours loss of time in travelling. For that, at the rate of 5s. 6d. a day he was paid, he now charged 7s. 1d.; for refreshment on the journey 1s. 6d.; and his cab-fare home from the railway-station 2s. 6d.; amounting in all to the sum now sought for.—By Mr. Roberts. He reckoned himself a good workman, and did what he was required or put to.—Henry Bourne said he was at the same spot, and saw plaintiff's work, which he thought good. He never heard anything said about the work being done unskilfully.—By Mr. Roberts. He had been suddenly discharged, but not for putting in an arch which was obliged to be taken out again, although such was done; but for why he knew not.—Mr. Roberts, in reply, said his honour's decision on the question at issue was of great importance to the trade; involving as it did the rights of master and workman; and was looked forward to with great anxiety by both parties.—Mr. Alfred Roper then deposed that he engaged plaintiff, believing him to be, as he represented himself, a skilful bricklayer; but found out that he was incompetent to do superior work; whereupon he was put to jobbing, and did not earn more than 2s. 6d. a day. It was agreed by him to pay the men's fare down and up, if they stayed till the job was finished; but not the latter if they were discharged for incompetency or misconduct; and certainly not then to be paid for any subsequent loss of time. There was no stipulation as to refreshments; but, knowing that in their transit down the men would be compelled to stay three hours at York; he, out of kindness, deputed Mr. Westaway, the book clerk, to give them each 1s. 6d. to purchase necessaries while there. The up fare he paid for those abruptly dismissed merely to get them quietly out of the village; as by stopping and lounging about the works some disturbances might have arisen.—Mr. Jonas Edward Bevis, clerk of works to defendant, said that plaintiff was quite incompetent to do what he had undertaken, and ought to have been discharged long before he was, but was not, as he was a steady man, and Mr. Roper thought it would be a disgrace to him to have so many changes and strange workmen introduced on the premises.—Mr. Westaway corroborated defendant's testimony as to the agreement with plaintiff being as he had stated.—His Honour thought plaintiff had entirely failed in establishing any claim; and his decision was, accordingly, judgment for defendants.

Summervile v. *The Same.*—In this caseCharles Summervile, also a journeyman, sought to recover a similar amount; when, it being satisfactorily shown that he was discharged for drunkenness and idleness, never having done a day's work, judgment was given against him.

Carmoody v. *The Same.*—Thomas Carmoody, another *employé*, said he, like the others, was dismissed after ten weeks, and sued only for 9s. 7d.; his item for cab-fare being but 1s.—Mr. Bevis and Mr. Batten, defendants' foremen, deposed that on examining a back front of the mansion which plaintiff had had to do, they found it was done in a very unworkmanlike manner; the brickwork being 1½ inch out of the level. On their speaking to him, he owned it was a disgrace, and admitted his inability to do it as it ought to be; and Mr. Roper being then communicated with, plaintiff was by him paid up to that time and discharged. This concluding the cases against defendants, it was given in their favour; the judge observing he could see no claim either of the men had to the moneys they sued for. Defendants had treated them from the first most liberally, and done what they were not bound to do; viz., on their discharge, through being unable to fulfil their engagements, according to the terms, paying their fares to London; whereas, after discharging and settling with them up to then, they were dissolved from all further liability. He should therefore order the expenses of Mr. Roper, who had given evidence, and the witnesses, to be paid by the three plaintiffs amongst them.—Mr. Roberts here said he was instructed by Mr. Roper to state, he did not wish that order to be enforced, as it was only on principle, and to caution his brother tradesmen against such a mode of imposture, the demands were resisted.

DECISIONS UNDER METROPOLITAN BUILDING ACT.

ADDITIONS TO WAREHOUSES.

At the Mansion-house, Mr. Lewis Glenton, a city merchant, attended before the Lord Mayor on a summons, alleging certain infringements by him of the Metropolitan Building Act of 1855.

It appeared that Mr. Glenton has recently erected extensive premises in Mincing-lane, the dimensions of which considerably exceed the limits allowed by law to be included in a separate building. He was, therefore, obliged by law to make provision to meet that state of things in the nature of party-walls. Mr. Young, the district surveyor, at whose instance the complaint was made in the public interest, was not satisfied that those walls were constructed in a manner to meet the requirements of the Metropolitan Building Act of 1855, and he caused a notice to be served on Mr. Glenton to that effect. Mr. Glenton thereupon submitted Mr. Young's objections to the Metropolitan Board of Works, who, exercising certain powers conferred on them by the Act, gave permission to Mr. Glenton to make certain variations. These Mr. Glenton proceeded to make, in conformity, as he thought, with the suggestions of the Metropolitan Board; but Mr. Young still felt dissatisfied, on the alleged ground that Mr. Glenton was not doing the work thoroughly and in the spirit of the alterations required by the Board. Under these circumstances the summons was taken out, and it was left to the Lord Mayor, as a magistrate and a practical man, to decide the matter at issue.

The summons first came on for hearing on the 18th of September, and was adjourned until the 2nd inst.

Mr. Child, solicitor, of Turnwheel-lane, who appeared for Mr. Young, the district surveyor, alleged that the variations in the building, suggested by the Metropolitan Board, had not been fully carried out, and he gave instances.

On the other hand, Mr. Glenton, who was attended by Mr. Whichcord, his surveyor, contended that he had obeyed the directions of the Board of Works in their spirit, and had made no intentional deviation from them.

The Lord Mayor said he had heard the statements made at the first hearing on both sides, and he had since visited the premises and carefully inspected the parts in question. He had also carefully looked at the plans and read an explanatory letter from Mr. Marrable, the architect, under whose advice the modifications in the building were conceded by the Metropolitan Board of Works. He found on the plans submitted by Mr. Glenton's architect certain iron doors were shown, but on a careful examination of the premises it seemed to him (the Lord Mayor) that these iron doors were unnecessary, looking to the spirit of the concessions made by the Metropolitan Board, and unnecessary also with regard to the prevention of risk from fire, seeing that the floors and walls were all built of incombustible materials. Besides, Mr. Marrable, in his letter, stated that, when he advised the concessions to be made by the Metropolitan Board, he did not consider the iron doors to be at all necessary, and that they formed no element in the reasoning by which he arrived at the conclusion he came to. He (the Lord Mayor) therefore had no hesitation in saying that the directions of the Board had been carried out in their spirit, and that the building in question might remain as it was. At the same time he thought that the district surveyor was justified, in the performance of his duty, in bringing the matter before a magistrate in the public interest.

The summons was then dismissed. The Lord Mayor declined to give leave to state a case with the view to an appeal to a superior court.

THE STAGE.

Haymarket.—The appearance on Monday last of Mr. Edwin Booth, whose name takes old playgoers back to the time of Edmund Kean, excited considerable interest in a very crowded house. The piece selected was the "Merchant of Venice," and, without displaying any remarkable genius, Mr. Booth gave a consistent and effective representation of the over-reached Jew, with whom, at the close, notwithstanding his evil nature, one is obliged to commiserate, so completely is he robbed. This, his last, scene he performed with great intelligence and discretion. Mrs. Charles Young was the *Portia*; and the quaint foolishness of *Launcelot Gobbo* was admirably presented by Mr. Buckstone.

The Princess's.—Mr. John Brougham's comedy, "Playing with Fire," has the great merit of being very amusing, and not without a purpose. With few parts in it, and all fairly good, and only two scenes required for the five acts, Mr. Brougham may expect to have it played all over the country. At the Princess's, the piece introduces to us a new actor, Mr. George Jordan, from America, who has good looks and figure, with a gentlemanly manner to aid him. Like other actors, however, from his country, he needs some good advice as to pronunciation. Mr. Brougham's own part, *Dr. Savage*, exactly suits him, and is exceedingly well played. Mr. Widdicomb, too, who enacts *Pinchbeck*—a

rascally assistant of the *Doctor*—and Miss Rose Leclercq, contribute materially to the good going of the piece. The drawing-room scene, at *Mr. Herbert Waverly's*, in which much of the action takes place, is exceedingly well fitted up. Mr. Fechter's "Othello" is looked for with great expectation.

Books Received.

A Guide to Typography; Literary and Practical; or, The Printer's Handbook and the Author's Vademecum. By Henry Beadnell, Printer. London: F. Bowering, 211, Blackfriars-road; and by all Booksellers.

Mr. Beadnell's very able and practical treatise on typography is now completed. It comprises two distinct parts or treatises,—one which is more especially the printer's handbook, and the other the author's vademecum; each of which, either as a volume, or serially, in nine fourpenny (or, by post, free, fivepenny) parts, may be had separately; but authors and printers would do well to procure both treatises; the one as a useful and valuable complement to the other. Indeed, much of the one is essential to an enlightened appreciation of the other. For behoof of the student, also, in the first part, the principles of English orthography are illustrated more at large than in any English grammar; especially as regards the proper formation of derivative, inflected, and compound words; and we have syllabication; punctuation rationally discussed; hints to unpractised authors on the preparation of copy for the press; and other useful and important matters. For the compositor (and for the author much of it as well), in the second part, there is an interesting and excellent summary of the history of printing; explanation of the various sized printing types; practical instructions of great use to the tyro in the art; the rationale of numerous schemes of "Imposition;" a scale of prices for compositors' work; short but comprehensive explanations of several foreign alphabets; with the plans usually adopted for the arrangement of the letters in the cases; instructions respecting job work and law work; with other judicious hints on numerous subjects interesting to the printer; and a supplementary chapter to the first part, on the changes which letters undergo in words derived from the Greek and Latin, with other interesting matter.

While the work was in progress, we expressed a decided opinion that Mr. Beadnell's masterly and valuable treatise was destined to form a reliable authority, and reference book, in many cases of difference, both in opinion and in practice, amongst printers, and also amongst authors, as well as between authors and printers, on typographical subjects; and we need only now remark, that the progress and completion of the treatises fully confirm us in our belief.

Miscellanea.

The Exhibition of 1862 and America.—We are glad to hear that her Majesty's Commissioners for the International Exhibition for 1862 have received a communication stating that a commission has been appointed to represent the interests of exhibitors from the United States of America in the coming Exhibition, consisting of the Hon. William Seward, Secretary of State, the Hon. Edward Everett, and several other distinguished gentlemen. We feared at one time that America would not be represented. We would express a hope that arrangements will be made to enable American artists, resident in England, to submit some of their works for exhibition.

Rennie's Floating Dock.—On the south shore, near Greenwich, inside the *Dreadnought* hospital ship, is one of the four floating docks which are being constructed by Messrs. George Rennie & Sons, for the Spanish naval arsenals. It consists of large rectangular pontoons, divided into several water-tight chambers, or compartments, but united as a whole. The dimensions of the base in the dock now made are,—350 feet long, 105 feet in breadth, and 12 feet 6 inches in depth; the total displacement being somewhat over 13,000 tons, and capable of lifting vessels of at least 7,000 tons. On the longer sides of the base are constructed hollow walls; the outside being perpendicular, and the inside with shoring steps, such as are in ordinary graving or dry docks; but they differ from them, in having no well at one end, or gates at the other; both ends being open, so that the length of the vessel to be docked is not of so much consideration as its height. The mode of docking a vessel is very similar to that in the ordinary process.

The Gurney Memorial Fountain and Obelisk at Stratford.—In the Broadway, Stratford, has been opened for the public use a set of drinking fountains, which, together with an obelisk, have recently been erected in memory of the late Mr. Samuel Gurney. The movement originated about two years ago, being set on foot by a working man in the neighbourhood, who has earned some local reputation as a public speaker in the temperance cause. The obelisk is in grey granite, 40 feet in height, and about 65 tons weight: it was executed by the Cheesewring Granite Company, from the designs of Mr. John Bell. On two sides of the base are drinking-fountains—the water flowing from sculptured groups of water-lilies in white marble; and on a polished slab forming the front of the base is the inscription in gold. Four lamps, erected by Mr. Casselton, of Stratford, stand at the corners of the structure.

School of Art for Andover.—A public meeting was lately held in the Town Hall, Andover, to hear an address from Mr. Buckmaster on the aid given by the Department of Science and Art to classes established for giving instruction in elementary science. The meeting was very numerously attended. Mr. Buckmaster gave an explanatory statement of the nature and conditions upon which the Department rendered assistance. The chairman, the Hon. and Rev. Samuel Best, in some remarks on the value of education as a means of success in life, said science was not only of practical value in the industrial arts, but it was a valuable mental discipline for young men. It taught persons to think. He thought the scheme which had been explained one of the most perfect and ingenious he had ever heard. The aid depended on their own exertions, and he hoped such excellent opportunities would not be lost by their indifference. A vote of thanks to the chairman and Mr. Buckmaster concluded the business of the meeting.

Telegraphic Progress.—At the shareholders' meeting of the United Kingdom Electric Telegraph Company (limited), recently held, the chairman stated that, "in the face of the un-English opposition they had to encounter, their works had rapidly proceeded towards completion, and their lines were now up the whole distance between London, Birmingham, Manchester, and Liverpool, and would soon be placed in their hands by the contractors. The company had already had communication between London and Oxford, Wolverhampton and Chester, as well as with Manchester and Liverpool, and their wires extended over about 360 miles." He also said that, "estimating that they had seven working hours a day, and considering that they would only charge 1s. for a message to Liverpool, which existing companies required 4s. for, they might look forward to a dividend of even 20 per cent." The wires of this company are chiefly suspended upon posts along the banks of canals and by the side of turnpike roads. At present the wires are confined to the northern portion of the kingdom, the farthest points reached being Manchester and Liverpool; but it is intended to extend them to the south, and generally throughout England.——A telegraph cable has been patented by Mr. J. Branscombe, of Islington. The insulated wires are coated with leather, which is by preference sewed around them, the external protecting wires being then laid over the leather. The leather makes a bed for the protecting wires to lie upon, and prevents them cutting into the insulating material; while at the same time the leather, particularly when in a moist state, is a sufficiently good conductor of electricity to admit of any defect in the insulating material being detected.——According to an invention by Mr. D. Ker, of Plymouth, the core of the cable which constitutes the electric conductor is formed of copper wire, either single or twisted: this is covered with a mixture of gutta-percha with a little vegetable or other wax added to it. The conductor thus protected is inclosed in a metallic tube, which is coated with a waterproof composition, such as marine glue, or gutta-percha and tar. A covering of whalebone, cane, or hard wood is laid round the cable, and another coat of the marine glue or composition is applied. A covering of zinc, in strips, is next laid over the cable, the flat part of the metal lying upon the cable, so as to remove the liability of cutting the composition with which the wire is insulated.——Mr. Joseph Rogers complains that his submarine telegraph cable, in which hempen rope is used, has been described as a desideratum in the report of the Government Commission, without mention of his name or invention; and that the Government engineers have refused to test his cable.

The late Herr Zwirner, Architect.—Our readers will have heard of the death of this distinguished architect, who was mentioned in our columns quite recently in connection with some new works. We may be enabled to give some particulars of his career hereafter. He had been long engaged on the restoration of Cologne Cathedral, and was elected an honorary and corresponding member of the Royal Institute of British Architects in 1847.

Sudden Death of Sir Thomas Blaikie.—Sir Thomas Blaikie, formerly for several years Lord Provost of Aberdeen, has died very suddenly. He received the honour of knighthood from her Majesty, in 1856, in recognition of his long and efficient public services. The family of Blaikie have long held a high local standing. Sir Thomas was the head of a firm that carried on an extensive business as plumbers, &c.; and he was also a member of the firm of Blaikie Brothers, founders, conducted by his brother, Mr. David Blaikie.

Monument to the Rev. Joseph Hunter.—A monument, executed by Mr. Edwin Smith, to the memory of the late Rev. Joseph Hunter, has been placed over the grave, in Ecclesfield churchyard, where the learned historian was interred in May last. The memorial consists of a plain slab of granite, sustaining a stout wrought-iron fence, and bearing the following inscription in capital letters:—

H. S. E.
JOSEPH HVNTER, S.A.S.
SACR. SCRINIORVM VNVS DE VICE-CVSTODIBVS,
QVI CVM IN ARCHIVIS NOSTRIS VERSARETVR.
SVMMO RERVM ANTIQVARVM STVDIO PROVECTVS,
MVLTA DOCTE, LVCVLENTER, ACCVRATE
SCRIPSIT,
SED PRÆSERTIM HVJVSCE AGRI
ANNALES LABORE EXPLORAVIT HISTORIÆQVE
MANDAVIT.
NATVS EST SHEFFIELDIÆ VITO DIE FEBRVARI
AO SALVTIS HVMANÆ M.D.CC.LXXXIIItio.
MORTVVS LONDINI IXNO DIE MAII
ANNO M.D.CCC.IXIMO
QVO IPSE VIVENS DESIGNABAT LOCO
IN PACE DEPONITVR.

Above the inscription, a bronze tablet, containing the arms of the deceased, granted June 26, 1843, modelled by Mr. Smith, is let into the stone: technically the insignia may be thus described:—Or, a buck's head, caboshed sable; on a chief, indented, of the second, three crosses pattee of the first. Crest, a beagle argent, his dexter fore paw resting upon a closed book. Motto (on a ribbon disposed above the shield), "*Vita, si cervina.*"

Sanitary Reform at Bedford.—The town council of Bedford are at present discussing the advisability of having "the Local Government Act of 1858, or any part or parts of it," adopted in the borough. The local *Times*, in a leading article on the subject, says—"It is a fact, and it is of no use to try to hide it—the drainage of the town is utterly inefficient; and, as the necessity for drainage daily increases, something must be done to improve it; or the accumulations, and other things (which, if smothered, will appear again in a worse form) will assert a deadly dominion over us." The writer, however, adds:—"It may be considered very irreverent, but we would rather trust the present sanitary committee of Bedford to report accurately on the condition of the drainage and water supply than the dilettanti staff of the privy council: nay more, we would rather trust to our own observation, and to our own nose, than to the great Chadwick's. If, then, we may be permitted to offer a suggestion to those who are more immediately concerned in the discussion of the question at this moment in Bedford, we say,—Find out what is really necessary to be done, and then do it yourselves. Of course, there will be a demur on the part of somebody to any proposal that may be made; but the time is gone by for rank absurdities to find favour with the people. We are quite sure that if any one were now to stand up at a public meeting and tell the poor that they were going to be robbed because a sensible scheme of improved drainage was attempted, he would take very little by his motion. The working man knows very well that if the drainage is bad the springs will soon be affected, and that his family will have polluted water as well as tainted air; and that one case of sickness in his house will cost in money value alone more than any taxation which local boards could possibly lay upon him. The people have, we admit, been slow to learn this, but they have learnt it, many of them from very sad experience. It will not do, therefore, to hold up to popular prejudice the bugbear of 'taxing the poor' in a case which is truly one where the wealthier classes will so largely contribute to the advantage of the poorest. This is especially the time when the subject may be fairly entered upon in Bedford."

The late Mr. William Leverton Donaldson.—We record with much personal regret the lamented death of this gentleman, which took place, at his house in Southampton-street, on the 26th ult. From the foundation of the Royal Institute of British architects, with which his brother, Professor Donaldson, was, as our readers know, most intimately connected, Mr. William Donaldson has acted as its honorary solicitor, and received, on more than one occasion, testimonials of the value the members attached to his services. He has shown his continued appreciation of the Institute by bequeathing to it a large painting, by Pannini, of the Coliseum at Rome. Mr. Donaldson was also the honorary solicitor of the Art Union of London for many years; one of the solicitors of the District Surveyors' Association; and was attached to several of the art societies of the metropolis. He has left sons, who give good promise of maintaining honourably the credit attaching to their name.

The Drainage of Oxford-street.—The parishioners of Marylebone residing in Oxford-street, are in a ferment as to the probable obstruction of the street during the Great Exhibition next year; and at a vestry meeting lately held, it was resolved to appoint a special committee and send a deputation to the Metropolitan Board, to request that some arrangement may be made for the clearance of the street during the Exhibition.

A Step towards the Establishment of "Horse Marines."—A letter from Paris says that all other inventions sink, and well they may, into nothing, before a new one, by which a "foot soldier in heavy marching order is enabled to *walk in the water without sinking*. It consists of a pair of India-rubber boots and trousers, all of one piece, which are filled with air a little below the waist, and heavily weighted at the feet. With these trousers on, a detachment has frequently crossed the lake of Vincennes, where the water is about 15 feet deep, firing their muskets, and loading as they went. The men sink about 2 feet, the water barely reaching the top of their thighs, and appear not to have any difficulty in keeping their balance and moving along."

The Realistic School. — Sir: The columns of the *Builder* have recently contained a translation of a French essay upon art, by Mr. Diderot, the premises of which are so extraordinary, so opposed to reason and morality, not to say religion, as to excite one's astonishment that such an enunciation of doctrine as that of its opening paragraph could have been penned among so logical a people as the French. Mr. Diderot, in common with other advocates of the realistic or individualist doctrine, doubtless, did not perceive its pernicious tendencies. I have never before overtaken the error in so bold and bodily a form as this. The essay opens thus,—"Nature makes no mistakes * * * and of all existing things there is nothing which is not as it should be." Let the argument be pushed to its legitimate conclusions. If nature makes no mistakes, everything is as it should be. Man is according to nature: therefore man is as he should be, and can make no mistakes. Corollaries: there can be no error; every word implying error is meaningless; any attempt to correct absurd. I believe these to be strictly logical deductions from Mr. Diderot's premises, which need no further commentary of mine.—W. Cave Thomas.

Excavations at the Goblin Hall, Gifford.—Comparatively few tourists have visited the ruins of the ancient castle of Gifford, situate within the Marquis of Tweeddale's picturesque demesne of Yester, and celebrated by Fordun in his "Scotochronicon," and Sir Walter Scott in the third canto of "Marmion." The ruin is supposed by some antiquaries to be one of the oldest relics of a baronial residence existing in Scotland; and recent excavations have brought to light some long buried portions of it, showing that it must at one time have been a building of considerable extent. Tradition long ago ascribed the origin of a portion of it, known as "the Goblin Hall," to magical art practised by Sir Hugo de Gifford, who died, according to Lord Hailes, in 1267. It is a vaulted chamber of considerable size, entered by a flight of steps, which have been discovered in the course of excavations made under the personal superintendence of the Earl of Gifford. The staircase, according to an Edinburgh paper, has been distinctly traced up to what must have been the inner court-yard of the castle, and in the process of uncovering it the workmen have come upon some boar's tusks and a number of human bones. From the floor of the hall a flight of steps leads to a well, and a subterraneam passage leads to it from the bank on the opposite side.

St. Michael's Church, Paddington. — On Sunday morning, the 29th Sept., the Bishop of London consecrated the new church dedicated to St. Michael, which has been erected in Market-street, Paddington, through the exertions of the Rev. Dr. Goulburn, incumbent of St. John's, and Mr. R. Gibbs, a City merchant. The church consists of nave and side aisles, with a few seats behind the chancel on the south side, the organ being on the north. The chancel is raised four steps above the nave, and the communion-table again rises three steps. There is a marble reredos with a large white cross, sedilia, and credence-table. The seats are all free, but they are to be appropriated for the use of the poorer parishioners. Mr. Rhode Hawkins, we believe, is the architect.

Serious Accident at Walsall.—In Station-street, at the corner of Park-street, one of the busiest parts of the town, and coming down from the Lichfield reservoir of the South Staffordshire Waterworks Company, is the main pipe for supplying the town with water; and a little beyond the bridge the main is carried from the level of the railway line up to the street. The main, from some cause at present unexplained, recently burst; and immediately the wall which divides Station-street from the railway fell in, to the length of 50 feet; completely stopping up the line with the *débris*. The rush of water was of course tremendous, and very soon that portion of the railway under the bridge was completely inundated, and the traffic to Lichfield and Cannock was suspended for about two hours. Fortunately there has not been any damage done to life or limb.

Perilous Accident with a Diving-bell. A diving-bell, into which two workmen entered to resume work at the Admiralty Pier, Dover, was just upon the point of being lowered, when the break of the jenny snapped, suddenly dropping the bell into the water. The distance from which it fell was not less than 80 feet. One of the men, who is the most experienced diver on the works, managed to free himself from the bell, but the other poor fellow was imprisoned in what promised to be a living tomb; the tube by means of which the bell is supplied with air snapping with the suddenness of the jerk by which it was released from its position. Another diving-bell was lowered, and a helmet-diver sent down; and, after two hours of the most persevering efforts, the disabled bell was released from its position and brought to the surface; the man imprisoned in it being insensible. He, however, afterwards recovered. He states that the bell in descending became two-thirds filled with water, so that about 40 cubic feet of air was all that was left him to breathe for the time he was confined.

TENDERS.

For new stables, Wood-lane, Hornsey. Mr. James Coe, architect. Quantities furnished:—

Turner & Sons	£439 0 0
Scott	419 0 0
Hill & Son	410 0 0
Meears	389 0 0

For new infant school and class-rooms, &c., at Middleton-road, Dalston. Mr. Joseph James, architect. Quantities supplied:—

Dove, Brothers	£1,385 0 0
Anley	1,335 0 0
Little	1,309 0 0
Alston	1,234 0 0
Turner & Sons	1,219 0 0
Scott	1,216 0 0
Conder	1,130 0 0
Callow	1,097 0 0
Kebbell	1,074 0 0

For house, Addlestone, Chertsey. Mr. James Coe, architect. Quantities supplied:—

Hill & Sons	£835 0 0
Scott	811 0 0
Turner & Sons	759 0 0
Meears	759 0 0
Newton	702 0 0

For making, kerbing, and completing two short roads and erecting boundary wall on the Turner Estate, West Ham, under the superintendence of Mr. John M. Dean, of Stratford, surveyor to the estate. Quantities supplied:—

Gossett	£545 0 0
Myers	508 0 0
Pilkington	490 0 0
Perry	475 0 0
Cordery	458 0 0
Anstriss	433 0 0
Cole	423 0 0
Strutt	420 0 0
Cosh	397 0 0
Yeoman	374 0 0
Rivett	373 0 0
Reed	358 0 0
Horn	320 0 0

For underground vault at the Croydon Cemetery:—

Wilkins & Bottom	£350 0 0
Stevenson	275 0 0
Dover (accepted)	250 0 0
Luxford	245 0 0
Ferguson	197 0 0

For building National Schools and teacher's residence, St. Thomas's, Exeter. Mr. A. Weslake, architect. Quantities supplied by Mr. W. Blackmore, surveyor:—

Kenshole	£1,599 10 0
Moass & Sons	1,517 0 0
Gush	1,487 0 0
Twitchen	1,446 14 10
Woodman	1,368 0 0
Mitchell	1,305 0 0
White	1,298 16 0
Brealy	1,298 0 0
Crabb	1,297 0 0
Fryer	1,245 0 0
Grant & Son (accepted)	1,095 10 0

For house, stables, &c., Burghfield, near Reading, for Mr. Horatio Bland. Mr. Walter Scott, architect, Liverpool:—

Alldred & Co.	£4,050 0 0
Mathews	3,939 0 0
Young & Co.	3,347 0 0
Stevenson	3,328 0 0
Glasscock	3,012 0 0
Dover (accepted)	2,961 0 0

For two semi-detached villas, Croydon. Mr. George Perry, architect:—

Malcot & Co.	£2,968 0 0
Deare	2,956 0 0
Piper & Co.	2,867 0 0
Patman & Co.	2,850 0 0
King & Co.	2,785 0 0
Freeman	2,665 0 0

For erecting and finishing a warehouse in King Edward-street, Newgate-street, for Messrs. Faudel and Phillips. Messrs. Tillott & Chamberlain, architects. Quantities supplied:—

Cannon	£1,795 0 0
Pritchard & Shelton	1,709 0 0
Rider	1,690 0 0
Piper & Wheeler	1,595 0 0
Fish	1,587 0 0
Heath	1,587 0 0
Wilis (accepted)	1,584 0 0

For alterations to the Crosby Head, Pitfield-street, Hoxton, for Mr. J. S. Sweasey. Mr. James Harrison, architect. Quantities not supplied:—

Samuel Smith	£997 0 0
Browne & Robinson	972 0 0
Patman & Fotheringham	946 0 0
Day	849 0 0

For two small houses, for Mr. Tylor, Lincoln-street, Chelsea. Mr. Cripp, surveyor:—

James & Ashton	£325 0 0
Pinder & Hawkins	320 0 0
Leggatt	223 0 0
Pugh & Wallis	217 0 0
Pawsey	210 0 0
Minter	210 0 0
Munroe	195 0 0
Hallett	160 0 0
Tite	154 0 0

For the restoration of a warehouse after fire at Rotherhithe, for Messrs. Henry Levy & Co. Mr. J. Thomas, Architect. Quantities by Messrs. R. L. Curtis & Son:—

Brown & Sons	£2,108 0 0
James & Ashton	1,697 0 0
Elliott	1,603 0 0
Duncan	1,600 0 0
Soper	1,575 0 0
Richards	1,547 0 0
Page	1,545 0 0
Rowe	1,493 0 0
Bowman	1,473 0 0
Manley & Rogers	1,460 0 0
Raby	1,427 0 0
Simmons & Argent	1,399 0 0
Sawyer	1,368 0 0
Bragger	1,365 0 0
Stevenson	1,345 0 0

TO CORRESPONDENTS.

R. V. E.—M. & M.—J. N.—Mr. N.—W. S. H. (send a description).—J. B. jun.—R. & Son.—S. T.—H. H. B. (thanks).—W. S.—D. S. (apply to Weale, Holborn).—J. R.—P, D.—H. W. B.—B. & L.—W. R. (must send some other evidence than his own).—A Churchman.—J. B.—* * (received).—Mr. R.—H. & Co.—J. G.—W. S.—H. F.—E. D.—E. J. E.—J. H.—W. R.—R. L.—J. G. (next week).—A Citizen (ditto).—L. M. H. (ditto).—Fresh Breezes.—W. R. C. (the masters assure us their shops are full and that the question is settled).—J. W. & Sons.

☞ *NOTICE.—All Communications respecting Advertisements, Subscriptions, &c., should be addressed to "The Publisher of the Builder," No.* 1, *York-street, Covent-garden. All other Communications should be addressed to the "Editor," and* NOT *to the "Publisher."*

Post-office Orders and Remittances should be made payable to Mr. Morris R. Coleman.

Advertisements cannot be received for the current week's issue, later than **FIVE o'clock, p.m.,** *on Thursday.*

ADVERTISEMENTS.

MR. WILLIAM ELLISON,
ARCHITECT and CONSULTING SURVEYOR,
OFFICES:—
13, FENCHURCH-BUILDINGS, FENCHURCH-STREET, E.C.

AN Architect and Surveyor in the country is in WANT of an Intelligent, Respectable YOUNG MAN desirous of IMPROVEMENT in his Profession.—Applicants may apply personally to Mr. W. G. COOPER, 61, Friday-street, London; or by letter to M. S. Post office, Newbury.

REQUIRED, in a Country Office, an IMPROVER, who would have every facility for perfecting himself in the duties of the profession of an Architect and Surveyor.—Address, E. W. S. care of Housekeeper, 3, Great James-street, Bedford-row, W.C.

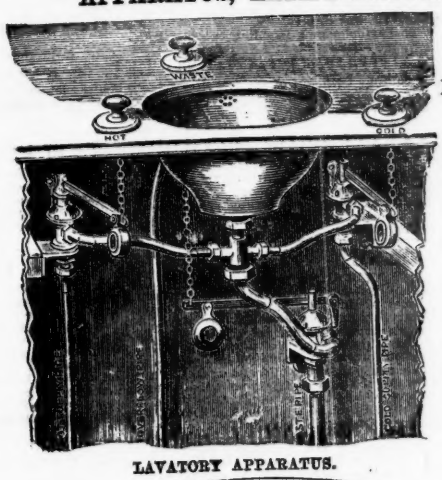
J. TYLOR & SONS,

MANUFACTURERS,

WARWICK LANE, NEWGATE STREET, LONDON.

J. TYLOR & SONS' PATENT REGULATOR WATER-CLOSETS, BATH APPARATUS, HIGH-PRESSURE TAPS, VALVES, LAVATORIES, &c.

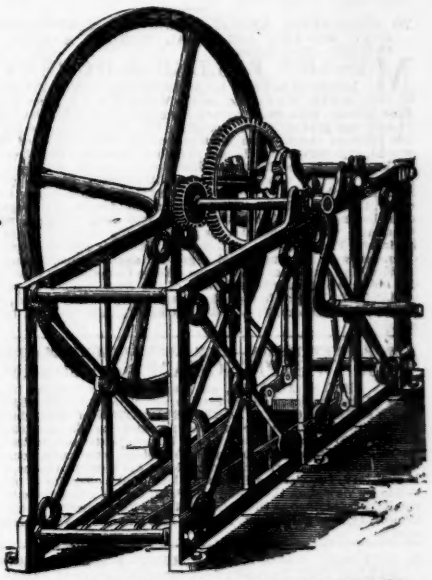
To be seen in action at the Manufactory,
WARWICK LANE,
And at the ARCHITECTURAL EXHIBITION, 9, Conduit-street, Regent-street, London.
ILLUSTRATED CATALOGUES ON APPLICATION.



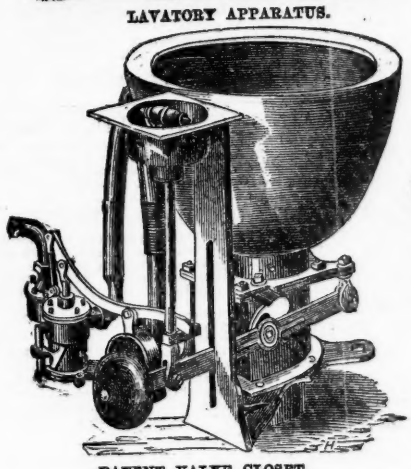
LAVATORY APPARATUS.

EQUILIBRIUM BALL VALVE.

HIGH-PRESSURE DIAPHRAGM VALVES.

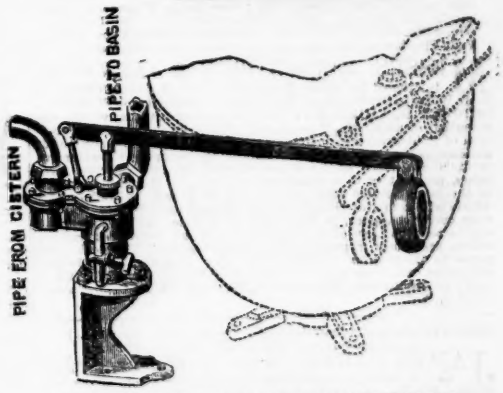


WELL-PUMPS, SUITABLE FOR ANY DEPTH OR CONSTRUCTION OF WELL.



PATENT VALVE CLOSET.

PATENT PAN CLOSET.



PATENT REGULATOR VALVE, AS APPLIED TO AN OLD CLOSET.

J. TYLOR & SONS' PATENT REGULATOR WATER-CLOSETS.

J. TYLOR & SONS, MANUFACTURERS, WARWICK LANE, NEWGATE STREET, LONDON.

CHEAP AND DURABLE ROOFING.

By Her Majesty's Royal Letters Patent.

F. McNEILL and CO. of LAMB'S-BUILDINGS, BUNHILL-ROW, LONDON

Manufacturers and ONLY Patentees of

THE PATENT ASPHALTED FELT, FOR ROOFING HOUSES, VERANDAHS, SHEDS, &c.

Patronized by

HER MAJESTY'S WOODS AND FORESTS,
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HONOURABLE EAST-INDIA COMPANY,
HONOURABLE BOARD OF ORDNANCE,
HER MAJESTY'S ESTATE, ISLE OF WIGHT,
ROYAL BOTANICAL GARDENS, REGENT'S PARK,

And by the most eminent members of the Royal Agricultural Societies of England, Scotland, and Ireland; at whose great national shows it has been exhibited, and OBTAINED THE PRIZE, for being the best and cheapest article for roofing; also used for under slates at the Royal Agricultural Society's House, in Hanover-square. Its advantages are lightness, warmth, durability, and economy. It is impervious to rain, snow, and frost, and a non-conductor of heat and sound. The Felt can be cut to any length, by 32 inches wide. The price is only ONE PENNY PER SQUARE FOOT. Samples, with full directions as to its uses and the manner of applying it, with TESTIMONIALS, some of them of seven years' experience, from Architects, Builders, Noblemen, and Gentlemen who have extensively used it, sent free to any part of the town or country. A Dry-hair Felt, for covering Boilers, &c. is also manufactured, by which a saving of about 25 per cent. in fuel is effected. The TRADE are respectfully enjoined to send their orders DIRECT to the FACTORY, as the surest means of being supplied with the genuine article, and in lengths best suited to their roofs. They are likewise CAUTIONED AGAINST MISREPRESENTATION, as THE ONLY WORKS in Great Britain where the above roofing is made are F. McNEILL and CO.'S Manufactories, LAMB'S-BUILDINGS, BUNHILL-ROW. Roofs covered with the Felt to be seen at the Factories, also the new Vice-Chancellor's Courts, the passages and offices leading to Westminster-Hall, and other buildings at the New Houses of Parliament.—A Liberal Discount allowed to the Trade.

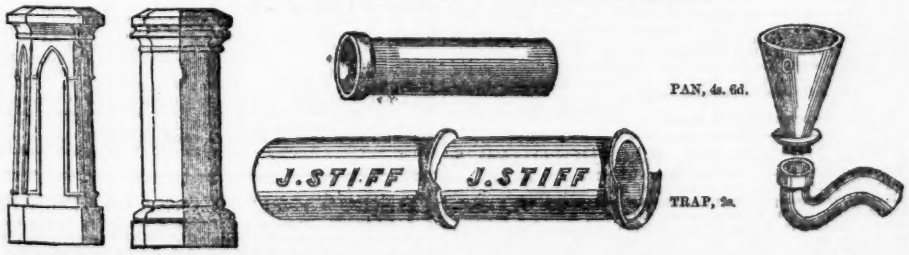
JAMES STIFF,

MANUFACTURER OF GLAZED STONEWARE DRAIN-PIPES, WATER-CLOSET PANS, SINK-TRAPS, INVERT BLOCKS, AND ALL OTHER ARTICLES SUITABLE FOR DRAINAGE PURPOSES; ALSO

IMPERISHABLE TERRA-COTTA CHIMNEY-TOPS, FLUE-PIPES, COPINGS, GARDEN EDGINGS, &c.

LONDON POTTERY, HIGH-STREET, LAMBETH, LONDON.

STRAIGHT TUBES, with SOCKET JOINTS, in Two-feet Lengths.



HALF-SOCKET PIPES same prices as the Whole Sockets, by the use of which Drains may be readily examined, and Junctions INSERTED, IN THE EVENT OF REQUIRING FURTHER CONNECTIONS.

May be had also at the following Wharfs, viz.:—
Messrs. GLADDISH'S, Pedlar's-acre, Lambeth; Dockhead Wharf, Bermondsey; Pratt Wharf, Camden-town.
Messrs. BLACKMORE & CO'S. City-road Wharf, City Basin.
Messrs. COLES, SHADBOLT, and CO.'S, St. James's and Thornhill Wharfs, Caledonian-road, Pentonville.
Mr. A. RITCHIE'S, Ravensbourne Wharf, Greenwich.
Mr. GEORGE ALLEN'S, Danver's Wharf, Chelsea.
Mr. LAVERS'S, Dowgate Wharf, Canal-road, Hoxton.
Mr. HENRY TURNER'S, 2, South Wharf, Praed-street, Paddington.

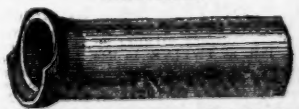
DRAWINGS, WITH PRICES, WILL BE FORWARDED FREE, ON APPLICATION.

PAN CLOSET fitted with LAMBERT'S VALVE, and UNDERHAY'S REGULATOR.

Lambert's No. 1 Ball Valve.
No. 87. By this arrangement any number of closets may be supplied from one Cistern, and no Service-Box, Cranks, &c. are necessary.
No. 83, Servants' Closet.

T. LAMBERT & SON,
FOUNDERS, HYDRAULIC AND GAS ENGINEERS,
SHORT STREET, LAMBETH.

TO SEWER CONTRACTORS.—STONEWARE PIPES.



BRANKSEA POTTERIES, POOLE, DORSET.

Messrs. SPILLMAN & SPENCE, Agents for the Owner of Branksea Island, are enabled to offer to Contractors and large Consumers, most advantageous terms for the sale of those first-class goods. Specimens may be seen at Messrs. SPILLMAN & SPENCE'S Offices, and an inspection is respectfully invited.
41 and 42, BELL YARD, TEMPLE BAR, LONDON, W.C.

SALES BY AUCTION.

TO ENGINEERS, ANIMAL CHARCOAL MANUFACTURERS, BONE BOILERS, ARTIFICIAL MANURE MAKERS, AND OTHERS.—Bermondsey.

MESSRS. FULLER & HORSEY are instructed to SELL by AUCTION, on MONDAY, OCTOBER 28, 1861, at ELEVEN o'clock, on the WORKS, a few paces from the Blue Anchor, Blue Anchor-road, Bermondsey, in lots, the valuable PLANT and MACHINERY, including two double-cylinder high and low pressure steam beam engines (one by Wentworth, of Wandsworth), cylinders of one 11½ and 24 inches diameter, 4 feet stroke, and of the other 11½ and 20½ inches diameter, 4 feet 6 in. stroke; a high-pressure pedestal steam-engine (but little used), 22-inch cylinder, 2 ft. 6in. stroke; one 10-horse power condensing beam-engine, Cornish boiler, three wrought-iron bone digesters, and two stout wrought-iron open boiling pans, 10 feet diameter, 4 feet deep (nearly new); one bone-mill, with 3 toothed rolls; one mixing machine, three pairs horizontal French stones, with gearing; one pair edge-runners, 6 feet diameter, with iron curbs; set of gun-metal air-pumps, coolers, vats, fat tubs, and numerous other items.—To be viewed at any time by special order, which may be obtained of the Auctioneers; or publicly, on SATURDAY prior to the sale, when catalogues may be had, on the Works; or of Messrs. FULLER & HORSEY, Billiter-street, London, E.C.

NEW BARNET, HERTS.—EXCELLENT BUILDING MATERIALS.

MR. WHITTINGHAM is instructed to SELL by AUCTION, on the Premises, within ten minutes' walk of the Barnet Railway Station, on MONDAY, OCTOBER 7th, at TWELVE for ONE, a FURTHER PORTION of the substantial MANSION, known as Lion's Down; comprising about 42,000 good bricks, 5,000 slates, oak and other beams, joists and rafters, floor boards, paving, coping, and guttering stone, stone sills, doors windows, cupboards, marble chimney-pieces, &c. three staircases, a cast-iron cistern, two cisterns lined with lead, and a quantity of old iron. —May be viewed on the Friday and Saturday preceding the sale; and catalogues obtained at the Railway Hotel, New Barnet; of the Auctioneer, 14, Moorgate-street, London, E.C. and of the Foreman on the estate.

To BUILDERS, MASONS, and OTHERS.—A variety of MARBLE CHIMNEY-PIECES, mostly from the old Chateaux of France, Belgium, and Italy; and the remainder of the Unfinished Stock of White and Coloured Marbles and portions of Chimney-pieces; Tools, including a turning lathe and iron centres for turning Scagliola columns and pedestals, &c; Saw Boxes, Plates and Heads, Blocks and Sheaths, various Implements, Poles and Ladders, a strong Stone-truck, with patent iron wheels; spring Vans, Carts, a Pony Phaeton and Harness, and other Miscellaneous Effects.

MESSRS. RUSHWORTH & JARVIS are instructed by Messrs. Browne & Co. to SELL by AUCTION, at their Works in Grafton-street East, London University, on TUESDAY, OCTOBER 15, CHIMNEY-PIECES, in various marbles, worthy the attention of architects, builders, and gentlemen engaged in the erection of residences; also many lots suitable for the trade,—portions of chimney-pieces, and other items, forming the residue of the extensive miscellaneous stock of the above eminent firm, to clear the premises, preparatory to a grand and final sale, in the ensuing spring of the manufactured stock contained in their principal gallery, and which will comprise chimney-pieces of surpassing beauty and the most costly character, in every variety of style. At the same time will be sold the Lease of the Dwelling-house and extensive Premises, unless previously disposed of by private contract. The stock comprised in the present sale will be on view four days prior to the sale, when catalogues may be obtained of Messrs. RUSHWORTH & JARVIS, Saville-row, Regent-street, W.; and No. 19, Change-alley, Cornhill, E.C.

MANSFIELD, Nottinghamshire.—To Stonemasons, Builders, Railway Contractors, and Others.—Preliminary Notice.

JAMES CARTER begs to announce that he has received instructions from the executors of the late Charles Lindley, Esq. to arrange his valuable STOCK-IN-TRADE and EFFECTS for immediate SALE by AUCTION. The property consists of Building Plant and Materials, scaffolding, a well-seasoned stock of boards, sundry ironmongery; a large stock of white and red Mansfield stone, including blocks, scantlings, slabs, and troughs in great variety; sheet lead and glass; many thousands of bricks, pan-tiles, drain-tiles, and pipes; several powerful crabs and cranes, stone drags of great strength; quarry, brick-yard, and smiths' tools; several strong carts, water-cart; six useful horses; two excellent railway trucks, for the carriage of lime; upwards of 30 tons of well-got hay, and a great variety of other effects.—Due notice will be given of the days of sale.—Descriptive catalogues are in course of preparation, and may be had early in OCTOBER, on application to Mr. WILLIAMS, at the Works, Mansfield; Mr. GODDARD, Architect, Lincoln; or of the Auctioneer, High-street-place, Nottingham.

MAIDENHEAD.

MESSRS. DANIEL SMITH, SON, & OAKLEY have received instructions to SELL by AUCTION, at the MART, near the Bank of England, on TUESDAY, OCTOBER 8th, at TWELVE, in Nine Lots, FIVE PLOTS of valuable FREEHOLD BUILDING LAND, situate near to the Maidenhead Station, on the Wycombe branch of the Great Western Railway, varying in extent from about half an acre to about three-quarters of an acre. Also, FOUR well-secured GROUND RENTS. Lot 1, on which is a substantially erected stable and double coach-house, has a frontage of about 120 feet to the Braywick-road; Lots 2 and 3 have extensive frontages to an intended road, which will connect the Braywick-road with the road towards Iver-place; Lots 4 and 5 have frontages to Broadway; Lots 6 to 9 comprise well-secured ground-rents of 8l. 10s. 7l. and 7l. per annum, respectively, for terms of 1,000 years. The neighbourhood is a good one for building purposes, and the contiguity to the town of Maidenhead renders the property very valuable.—Particulars, with plans, may be had at the Bear Hotel, Maidenhead; at the Mart; of Messrs. DE JERSEY & MICKLEM, Solicitors, 13A, Gresham-street, West, E.C.; of Messrs. BROWN & FLETCHER, Solicitors, Maidenhead; and of Messrs. DANIEL SMITH, SON, & OAKLEY, Land Agents and Surveyors, 10, Waterloo-place, Pall-mall, S.W.

HAVERSTOCK HILL.—TO BUILDERS AND OTHERS.

MR. BRAY, junior, will SELL, at the MART, on TUESDAY, 22nd of OCTOBER, in three lots, THREE LONG LEASEHOLD (unfinished) SEMI-DETACHED RESIDENCES, of handsome elevation, and in a forward state towards completion, situate in the Lawn-road, St. John's Park, Haverstock-hill, N.W. The very superior residences command picturesque views both front and rear, and are about five minutes' walk from the Chalk Farm, Hampstead Heath, and Kentish Town Railway Stations, and are held for 89 years, at 17l. per annum for each house, estimated annual value (when finished) 105l. each house.—Particulars and conditions of sale may be had of W. LUND, Esq. Solicitor, 37, Castle-street, Holborn; of E. J. KELLY, Esq. Architect and Surveyor, 23, Thavie's Inn, Holborn; at the Mart; at the Load of Hay Tavern, Haverstock-hill; and at the Offices of the Auctioneer, 16a, King's-road, Bedford-row, W.

BRICKS.—BRICKMAKER'S PLANT and BUILDER'S STOCK-IN-TRADE, consisting of Fir Poles for Scaffolding and the Tools and Implements connected with the Bricklaying and Mason's Departments, TO BE SOLD BY AUCTION, without reserve, by ROBERT NEWTON, at SLADE END, Chatteris, Cambridge, on THURSDAY, 10th day of OCTOBER, 1861, at ELEVEN o'clock, at the Brick-kiln, adjoining the Gas-works.

GREAT NORTHERN RAILWAY.—Second Sale of Building Materials, to clear the site for the Hotel Curve Line, to form a junction with the Great Northern and Metropolitan Railways at King's-cross.

MR. C. F. SMYRK begs to announce that he has been honoured with instructions from the Great Northern Railway Company, TO SELL by AUCTION, on TUESDAY, OCTOBER 8, 1861, at TWELVE, in lots, to be taken down and cleared away by the respective purchasers, all the sound, useful MATERIALS and FIXTURES of twenty-one 6-roomed HOUSES. Also, a quantity of loose MATERIALS, situate in Northampton-street, Norfolk-street, and Ashby-street: comprising 400,000 bricks and tiles, 200 squares of roofing and flooring, stone paving, window sills and coping, lead-gutters and pipes, sashes and frames, doors, and other fittings; dressers and shelves, stoves, ranges, coppers, &c.—On view the day prior to the sale, when catalogues may be had, on the Premises, or at Mr. SMYRK'S Offices, 108, Fleet-street, City.

CAPITAL BUILDING MATERIALS, BOW CHURCHYARD, CHEAPSIDE.

PULLEN, HORNE, & EVERSFIELD are instructed to SELL by AUCTION, on the PREMISES, on FRIDAY, OCTOBER 11, at TWELVE, in lots, the whole of the capital BUILDING MATERIALS of the spacious warehouses, dwelling-houses, and premises of Nos. 2, 3, and 4, Bow-churchyard; comprising excellent brickwork, sixty square of slates, tiles, timber, sashes, doors, chimney-pieces, and interior fittings; 140 square of flooring-boards, paving, warehouse fronts, several tons of lead, and a large mass of useful and valuable materials, fixtures, and fittings-up.—May be viewed the day previous. Catalogues had of Messrs. TRESS & CHAMBERS, Architects, 27, Queen-street; and of PULLEN, HORNE, & EVERSFIELD, 80, Fore-street, City, and 40, Parliament-street, Westminster.

MILLBANK STREET, WESTMINSTER.—MARBLE in BLOCKS.

PULLEN, HORNE, & EVERSFIELD are instructed by Mr. J. Udny, agent for Count Lazzoni & Son, to SELL by AUCTION, at the MARBLE WHARF, 19, Millbank-street, Westminster, on WEDNESDAY, OCTOBER 16th, at TEN for ELEVEN, the following MARBLE, viz.:—eighty blocks of statuary, eighty of Sicilian, twenty of vein, four of black and gold, three of Sienna yellow, one of Bardilla, and one of dove.—May be viewed three days previous; and catalogues had on the premises, and of the Auctioneers, 40, Parliament-street, Westminster, and 80, Fore-street, City.

N.B. Approved bills at six months will be taken in payment.

EUSTON-ROAD.—MARBLE CHIMNEYPIECES.

PULLEN, HORNE, & EVERSFIELD are instructed by Mr. J. A. Brine to SELL by AUCTION, on the PREMISES, 135, Euston-road, near St. Pancras Church, on WEDNESDAY, OCTOBER 23rd, at TWELVE for ONE, about 100 MARBLE CHIMNEYPIECES, in every variety of design, and executed in the best manner in statuary, vein, Sicilian, black, and other coloured marbles. Several of the above are richly sculptured. May be viewed two days previous, and catalogues had on the Premises, and of the Auctioneers, 40, Parliament-street, and 80, Fore-street, City.

PRELIMINARY ANNOUNCEMENT.—The Valuable Materials of the East-India House.

PULLEN, HORNE, & EVERSFIELD have the honour to announce that they are instructed to prepare for SALE by AUCTION, on the PREMISES, on WEDNESDAY, OCTOBER 30, and following days, in lots, the first portion of the valuable MATERIALS of the EAST-INDIA HOUSE, in Leadenhall-street.—Detailed particulars will be published in a few days; when catalogues may be had on the Premises; and of PULLEN, HORNE, & EVERSFIELD, 80, Fore-street, City, and 40, Parliament-street, Westminster.

REIGATE, SURREY.—The WESTFIELD ESTATE, comprising a capital Residence, with Pleasure-grounds and small Park of about 16 acres.

MR. JOHN LEES has received instructions from the Proprietor to SELL by AUCTION, at the MART, opposite the Bank of England, on WEDNESDAY, OCTOBER 16, at TWELVE, in one or more lots, unless an acceptable offer be previously made by private contract, a very desirable FREEHOLD RESIDENCE, in the Gothic style, with ornamental grounds, beautifully planted and timbered, and a small park of undulating land, altogether nearly 16 acres, within a ring fence. This property is delightfully situate on the hill at Reigate, three-quarters of an hour's ride from London, about half a mile north of the Town Station, at an elevation of about 100 feet above the railway. The aspect of the house is due south, and sheltered from the north and east by the Reigate and Gatton hills. The soil is dry; water abundant and good. The house is tastefully decorated, and in good order: it contains, on the basement, a larder, wine and coal cellar; on the ground-floor, dining-room, 21 feet by 17 feet; library, with groined ceiling, 20 feet by 12 feet; breakfast-room, 15 feet by 11 feet; and drawing-room, 24 feet by 17 feet, opening to conservatory, 40 feet long; kitchen, scullery, and butler's pantry; on the first floor there are four principal bed-rooms, two dressing-rooms, and one servants' room; on the second-floor, two bed-rooms, but others can readily be formed. There is a two-stalled stable and coach-house, together with the usual out-offices. The kitchen-garden is well stocked, and of good size.—Particulars may be obtained of ORTON LUCAS, Esq. Solicitor, 50, Fenchurch-street, London; at the hotels in Reigate, Dorking, Guildford, Horsham, Brighton, Epsom, Croydon, Tunbridge-wells, and Hastings; at the Mart; and of Mr. JOHN LEES, Estate Agent and Auctioneer, Reigate, Surrey, of whom alone orders to view may be obtained.

BUILDING GROUND, HORLEY, SURREY.

MR. JOHN LEES has received instructions to SELL by AUCTION, at the CHEQUERS INN, Horley, on THURSDAY, OCTOBER 17, at TWO for THREE o'clock, in lots, a desirable FREEHOLD PROPERTY, with immediate possession, desirably situate, and possessing frontage to the two turnpike roads leading from London to Brighton, at a short distance only from the Horley Railway Station, and one hour's ride from London. The land will be divided in building plots, suitable for the erection of villa residences, which in this locality would let to respectable tenants at good rents, while the plots will confer votes for the Eastern division of the county of Surrey.—Particulars may be obtained of GEORGE CARTER MORRISON, Esq. Solicitor, Reigate; at the inns in the neighbourhood, and at East Grinstead, Crawley, Cuckfield, Horsham, Guildford, Reigate, Dorking, Epsom, Ewell, and Croydon; at the "Estates Gazette" Office, 200, Fleet-street, London, E.C; and of Mr. JOHN LEES, Estate Agent and Auctioneer, Reigate, Surrey.

KENTISH-TOWN.—TO MASONS, ARCHITECTS, BUILDERS, AND OTHERS.

MESSRS. LEREW & LEREW will SELL by AUCTION, on the PREMISES No. 6, Bartholomew-place, on THURSDAY, OCTOBER 10th, at TWELVE, 36 Marble, Slate, and Stone CHIMNEYPIECES; six Pedestals; Obelisk, 12 feet high; two Monuments, Gothic Tomb-stone, 12 Head-stones, Tablet, 44 Cement Figures and Vases, and useful Stone and Marble. May be viewed the day before the sale, when catalogues may be had on the Premises, or of the Auctioneers, Cardington-street, Hampstead-road.

CITY ROAD.—ST. BARTHOLOMEW'S HOSPITAL.—To BUILDERS and OTHERS.—TO BE LET, on Lease, for sixty years from Christmas next, the GROUND occupied by the houses numbered 213, 215, 217, 219, 221, 223, 225, City-road, adjoining the Eagle Tavern.—For further particulars apply at Mr. HARDWICK'S Office, No. 1, Henrietta-street, Cavendish-square. Tenders are to be sealed up, and delivered at the Clerk's Office, within the Hospital, on TUESDAY, the 8th OCTOBER, at ELEVEN o'clock precisely. WILLIAM WIX, Clerk.

St. Bartholomew's Hospital, September, 1861.

CITY ROAD.—ST. BARTHOLOMEW'S HOSPITAL.—To BUILDERS and OTHERS.—TO BE LET, on repairing leases, for twenty-one years, from Lady-day, 1862, the HOUSES Nos. 1 to 30, inclusive, in Windsor-terrace, City-road, and the houses Nos. 1 to 26, inclusive, in Wellesley-street, City-road.—For further particulars, apply at Mr. HARDWICK'S Office, No. 1, Henrietta-street, Cavendish-square. Tenders are to be sealed up and delivered at the Clerk's Office, within the Hospital, on TUESDAY, the 8th day of OCTOBER, at ELEVEN o'clock precisely. WILLIAM WIX, Clerk.

St. Bartholomew's Hospital, September, 1861.

CITY ROAD.—ST. BARTHOLOMEW'S HOSPITAL.—To BUILDERS and OTHERS.—TO BE LET, on a Building Lease, for sixty-one years from Lady-day, 1862, the GROUND now occupied by the Infirmary, situate next the Windsor Castle Public-house, Windsor-terrace, City-road, having a frontage towards the City-road of 43 feet, and a depth of 220 feet.—For further particulars apply at Mr. HARDWICK'S Office, 1, Henrietta-street, Cavendish-square. Tenders are to be sealed up, and delivered at the Clerk's Office, within the Hospital, on TUESDAY, the 8th OCTOBER, at ELEVEN o'clock precisely. WILLIAM WIX, Clerk.

St. Bartholomew's Hospital, September, 1861.

FREEHOLD LAND for SALE, in the County of Middlesex.—A PLOT of almost 12 acres 2 roods, picturesquely situated on the crown of a hill, in a good neighbourhood, with an extensive frontage to the high road, and near a railway station, with a City terminus, in course of construction.—Apply to FRITCHARD & SONS, Solicitors, Doctors' Commons, E.C.

ST. BARTHOLOMEW'S HOSPITAL.—To BUILDERS and OTHERS.—A Committee of Governors will be held at this Hospital on TUESDAY, the 8th OCTOBER inst. at ELEVEN o'clock in the forenoon precisely, to receive PROPOSALS from such persons as may be willing to TAKE on a BUILDING LEASE, or LEASES, for a term of 70 years, that most eligible PLOT of GROUND, now vacant, and situate in Newgate-street and King Edward-street. The plans and elevations for buildings to be erected on the ground may be seen at Mr. HARDWICK'S Office, No. 1, Henrietta-street, Cavendish-square, where further particulars may be ascertained. The Proposals are to be sealed up, and delivered at the Clerk's Office, within the Hospital, on TUESDAY, the 8th instant, at ELEVEN o'clock precisely. WILLIAM WIX, Clerk.

St. Bartholomew's Hospital, October, 1861.

BUILDING LAND TO LET, on leases of long term, one of the best sites for good houses; let well; over 100l. per annum. Money advanced. Also, lime, bricks, and sand, if required.—Apply to Mr. PARKS, Lewisham.

WATERSIDE PREMISES.—To PUBLIC COMPANIES, WHARFINGERS, and OTHERS.—TO BE LET, by TENDER, the PROPERTY at MILLWALL, lately known as Messrs. Ferguson's Mast-house and Pond; having a frontage next the Thames of 448 feet, and occupying an area of about 3½ acres, suitable for a dock or warehouses.—Apply at IRONMONGERS' HALL, Fenchurch-street.

TENBY, PEMBROKESHIRE.—TO BE SOLD by PRIVATE CONTRACT, and with immediate possession, ST. MARY'S HILL, the residence of the late Lieutenant-colonel Wedgwood: consisting of entrance-hall, drawing-room, library, dining-room, four best bed-rooms, two dressing-rooms, servants' rooms, and abundant offices; flower-garden, greenhouse, &c.; modern three-stalled stable, coach-house, and saddle-room; walled kitchen garden, gardener's cottage, labourer's cottage, and yard. The house and gardens are held under leases of the Corporation of Tenby, of which the house has sixty-one years unexpired at a ground-rent of 5l. a year; and the garden fifty-nine years, at a yearly rent of 7l.—For all particulars, apply to the Rev. R. WEDGWOOD, Dumbleton Rectory, Evesham.

LONG LEASEHOLDS, subject to premium, ground-rent, &c. will be granted by the Freeholder of several houses of from five to sixteen rooms each, built on high ground, about four miles south of Charing-cross, in a pleasantly situate park, through which there is no public right of way.—Apply to Mr. JARMAN, Estate and House Agent, 2, Camden-terrace, Peckham-road, S.E.

A BARGAIN.—TO BE SOLD, a PIECE of FREEHOLD BUILDING LAND, situate at Forest Hill, near the railway station. It contains 60 feet frontage, and about 200 feet deep. Also a lot of NEW BUILDING MATERIALS.—For further particulars, apply to J. G. 4, Praed-street, Paddington.

VAUXHALL GARDENS ESTATE.—BUILDING PLOTS for HOUSES and Shops on Long LEASE, direct from the freeholder, at moderate ground-rents. TO BE LET, fronting the main road and new thoroughfare now making.—Apply to Mr. COLSTON, 6, Goding-street, Vauxhall; to Mr. EDMESTON, Architect, 5, Crown-court, Old Broad-street; or to Messrs. DRIVER, Land Agents, 5, Whitehall.

TO BRICKMAKERS, BUILDERS, and OTHERS.—The LEASE of an Old-established BRICKFIELD TO BE SOLD, within two miles of the City, the present Proprietor retiring from business. May be seen in full work.—For particulars, apply to Mr. J. WILSON, any day after ONE o'clock, on the Premises, Devon's-road, Bromley Park Brickfield, Bromley, Middlesex.—The present Proprietor will give instructions to any one not acquainted with the business, if required.

FIRST-CLASS MANUFACTURING PREMISES TO BE LET.—Two floors, 94 by 32; two ditto, 70 by 32; one shop three floors, 51 by 20; yard to same, 51 by 20. FOR SALE, an 8-horse power Steam engine and Boiler; also, a Builder's Light Cart.—Inquire at 1, Brook-street, Euston-road.

BUILDING GROUND.—WAPPING IMPROVEMENTS.—The Board of Works for the Limehouse District hereby give notice, that they are prepared to receive TENDERS from parties who may be willing to TAKE on LEASE certain PLOTS of LAND in High-street and Red Lion-street, Wapping.—Particulars, conditions, and form of Tender may be obtained at the Office of the Board, White Horse-street, Commercial-road East. Tenders are to be delivered at the Office of the Board on or before TEN o'clock, a.m. on FRIDAY, the 1st NOVEMBER, 1861. The Board does not bind itself to accept any Tender.

THOMAS W. RATCLIFF, Clerk to the Board.

September, 1861.

TO BUILDERS.—TO LET, some partially erected CARCASES, situate near the Richmond-road, Dalston, in a locality where houses of a similar class are in great demand, and let well. Liberal advances, and bricks supplied to respectable parties. Term, ninety-nine years. Ground-rent low.—For particulars apply to GEORGE CLARKSON, Surveyor, 9A, Great St. Helen's, City.

ROTHERHITHE.—To BUILDERS and OTHERS.—FREEHOLD PROPERTY, belonging to St. Bartholomew's Hospital, TO BE LET, on a Building Lease, with a frontage of 100 feet to the river.—The plan may be seen at Mr. HARDWICK'S Office, No. 1, Henrietta-street, Cavendish-square, where further particulars may be ascertained.

WILLIAM WIX, Clerk.

St. Bartholomew's Hospital, September, 1861.

VALUABLE BUILDING GROUND, North Woolwich.—TO BE LET, about Three and a Half Acres of FREEHOLD LAND, Low ground-rents. Houses of from 20l. to 30l. per annum much wanted. Near station and church.—Full particulars at the Offices of Mr. J. B. WATSON, Architect, 9, Nottingham-place, Marylebone-road, W.

POLYTECHNIC INSTITUTION.—The Directors beg to announce that the Second of the First Course of Monday Evening Lectures and Musical Entertainments for the Industrial Classes will be given on MONDAY next, at HALF-PAST SEVEN o'clock, by Professor J. H. Pepper, who will deliver a Lecture on the "Art of Balancing," explaining the principles on which Blondin and Leotard perform their wonderful feats; also, at Half-past Eight, Concert by the Cremona Musical Union, the Greenhead Family. The following gentlemen have kindly promised to deliver lectures in this course:—The Rev. J. Butterworth Owen, M.A.; Dr. Lankester, F.R.S. &c.; Dr. Chr. Dresser, F.L.S. &c.; Dr. Ryan, LL.D. (late Polytechnic); the Rev. A. Bath Power, M.A., F.C.S.; Douglas Thompson, esq.; Dr. Edmund Pick; W. R. Birt, esq.; G. A. Cooper, esq.; Walter Newport, esq. and the St. George's Choir; George Buckland, esq.; and the Cremona Musical Union, the Greenhead family.—Admission tickets at half-price are now being distributed to the heads of firms and employers of labour, which will admit those in their employ and their families.—JOHN HENRY PEPPER, Hon. Director.

BURROW'S SIX-GUINEA LANDSCAPE GLASSES.—These fine instruments, combining all the latest improvements, are the BEST FIELD GLASSES that can be purchased. Sent on receipt of Post-office orders to W. & J. BURROW, Malvern.

SOLE LONDON AGENTS:—

For the City, JOHN BENNETT, 62, Cornhill.

For the West-end, B. ARNOLD, 72, Baker-street.

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